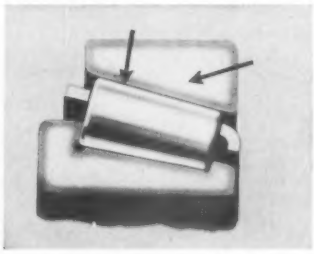
ENGINEERS AND MANAGEMENT

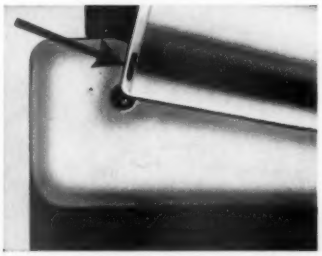
the OIL AND GAS JOURNAL

6 good reasons for specifying TIMKEN® tapered roller bearings

26 TYPES. Because Timken® bearings are made in 26 types, you get exactly the right tapered roller bearing for your job.

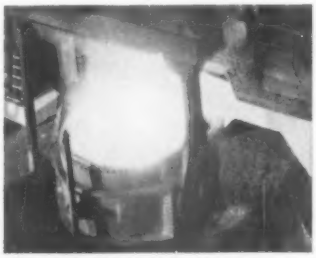


TOUGH INSIDE—HARD OUTSIDE. Case carburizing of rollers and races gives a wear-resistant surface, shock-resistant core.

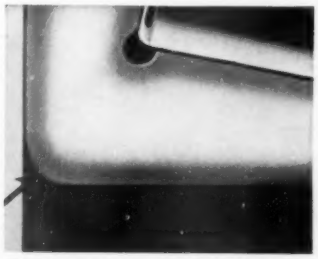


RIB OF CONE maintains roller alignment, prevents skewing, assures maximum bearing capacity.

5850 SIZES. If you need a tapered roller bearing smaller around than your finger or as large as 71½" in diameter, you can get it from The Timken Roller Bearing Company.



WE MAKE OUR OWN STEEL. Because Timken bearings are made of special alloy steel, produced in the Timken Company's own mills, they have extra strength and wear resistance.



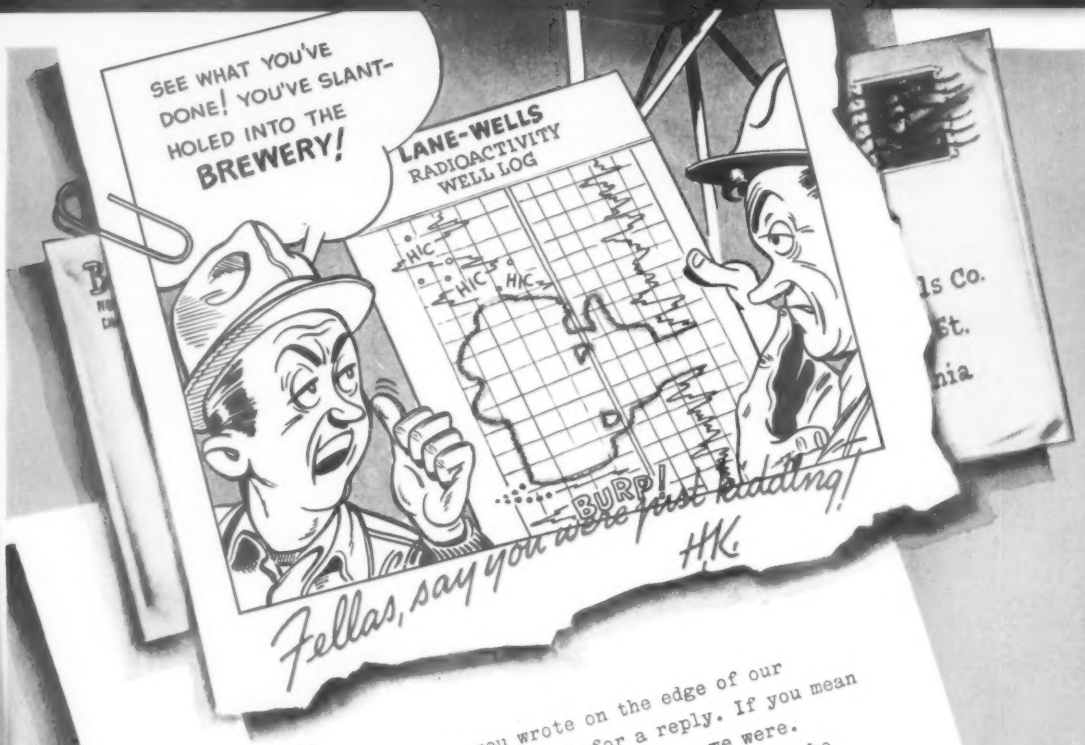
GENEROUS RADIUS on the inside diameter of Timken bearing cones permits greater shaft strength.

No other tapered roller bearing gives you all the advantages you get with Timken bearings. Be sure every tapered roller bearing you use carries the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION ✳

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **JANUARY 19, 1953**



Dear Hank:

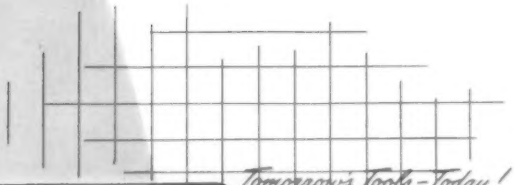
Received the note you wrote on the edge of our cartoon, and we're sort of stuck for a reply. If you mean were we kidding about the slant hole, sure we were. We've never known a driller careless enough (or maybe lucky enough) to do that.

But if you're talking about the behavior of the neutron curve -- well, yes and no. We've never claimed that the neutron curve would tell what kind of fluid, but it will indicate fluid in the formation -- and do that so accurately that, in some areas, we can tell you how much fluid. Quantitative interpretation is practically as remarkable as the cartoon, and plenty of operators can tell you how that's paid off for them.

Cordially,

F. R. Cordes

Lane-Wells Company



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Radioactivity Well Logging

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THE OIL AND GAS
JOURNAL
Vol. 51, No. 37

CONTENTS FOR JANUARY 19, 1953

NEXT WEEK

• ANNUAL REVIEW AND FORECAST NUMBER. This important number reports on last year's records, and makes predictions for 1953, the latter being based on careful compilation of statistics and actual programs of operators. Detailed records of 1952, with comparisons of previous years, will be presented in wildcatting, drilling, discoveries, reserves, production, refining, demand, natural gas, light hydrocarbons, and the various other branches of the industry.

Here's an issue you'll want to keep handy all year long.

REGULAR DEPARTMENTS

They Say ... 43
Calendar of Events ... 47
Journally Speaking ... 51
Editorial ... 53
This Week ... 57
Watching Washington ... 58
International News ... 68
Personals ... 72
Deaths in the Industry ... 78
Books ... 122
On the Job ... 123
Engineering Reference ... 129
Corrosion Control ... 131
Heat Transfer ... 133
Refiner's Notebook ... 135
Modern Drilling ... 137
Engineering Fundamentals ... 139
Questions on Technology ... 141
Equipment Digest ... 143
Pipe-Line News ... 147
Refining News ... 152
Natural-Gas News ... 157
Drilling Contractors ... 158
Active Rotary Rigs ... 159
Exploration Statistics ... 182
Production Statistics ... 183
Refining Statistics ... 184
Market Statistics ... 185
Equipment Men in News ... 186
Classified Advertising ... 187
Advertisers' Index ... 191

EXPLORATION—DEVELOPMENT

Wildcats Check Future Province 161
Highlights of Week ... 161
Reports by Areas ... 163

NEWS FEATURES

Companies Reject Truman Offer to Drop "Cartel" Investigation ... 56
Holland Reintroduces Bill to Quitclaim Tidelands to States ... 57
Report Analyzing Residual Trends Over Past 6 Years Released ... 59
PAD Sets 1953 Total Demand at 8,031,000 Bbl. Daily in Forecast ... 60
Discovery of 25 Billion Barrels in Western Canada This Century Possible ... 61
Vancouver May Become Major Oil-Export Port, Imperial Executive Says ... 62
Petroleum Does Not Include Natural Gas, Privy Council Rules ... 62
Indiana Standard to Begin Construction of North Dakota Refinery Soon ... 63
Texas Co. Finds Oil on Bay Junop Dome After Quitting Area Twice ... 63
New Fuels Tests Outlined at Annual S.A.E. Meeting in Detroit ... 64
International Cooperation Needed in Allocating Markets, Duce Says ... 66
Transcontinental Celebrates Completion of Biggest Microwave System ... 67
Anglo-Iranian Claim to Oil Exported From Iran Supported by Court ... 68
Future of Schoonebeek Field Seen as One of Gradual Decline ... 69

ENGINEERING-OPERATING FEATURES

Increased Efficiency Without Loss of Safety ... 80
This 11,000-ft. jackknife rig is equipped with 133-ft. mast, and designed for quick moves. By Roy F. Carlson.

Journal Check Chart. What Is This Equipment? ... 82
Here's a feature designed to test your knowledge of oil and gas-producing and refining equipment.

Success Story . . . Plenteous Raw Materials, Expanding Market, Right Price 83
Here's a look at the factors which are so strongly influencing the growth of petrochemicals. By Martin Buck.

Trinidad Refinery Completes Its Modernization ... 87
Many of the large vessels were fabricated in Trinidad, the United Kingdom supplying the steel.

Radioactive Isotope-Equipped Go-Devil Cuts Cost for Anglo-Iranian ... 91

Improved Bulk-Volume Cell Speeds Porosity Determinations ... 94
An accurate and rapid method of determining the porosity of large and small core samples. By H. C. Hamontre and Cleo G. Rall.

Skid-Mounted Poly Unit Installed at Inland Refining Co. Plant ... 99
Unit at Palestine, Tex., is contained on four skids, plus the individual reactor. By F. Lawrence Resen.

Journal Report on How to Meet the Engineering Shortage ... 102
A question-and-answer interview with Dr. Emory N. Kemler, educator and research director.

What Management Expects of Its Engineers ... 106
Producing department manager of major company lays it on the line in an interesting interview.

Pipe-Line Movement of Crude Oil ... 110
This is the third in a series on how the Texas Railroad Commission operates. By Roy F. Carlson.

Antwerp Refinery to Process Middle East Crude ... 115
Combination unit eliminates major equipment items through use of new techniques and by integrating the process.

On the Job . . . In the Plants ... 123
New communications system of Indiana Standard at Casper.

On the Job . . . In the Fields ... 127
How West Coast firm handles wrapped big-inch pipe.

Engineering Reference Section ... 129-141
Oil and Gas Equipment Digest ... -143

GREATER RESISTANCE TO CORROSION AND MECHANICAL DAMAGE...

with the HARTZELL

COOLING TOWER FAN

HARTZELL pioneered giant-sized cooling tower fans with Hartzite blades for the petroleum industry. The complete success with which they have operated over a period of years proves their dependability.

Large Hartzell blades are made of Hartzite (reinforced plastic). Hartzite resists corrosion unusually well; it absorbs vibration and is not notch conscious; if its surface is damaged the exposed interior has the same corrosion and damage resistance.

Hubs are many times stronger than required.

All Hartzell cooling tower blades are adjustable-pitch. You can change air-delivery to suit changed needs. All steel hubs are dynamically balanced and all blades are balanced against a master blade.

Those are some of the reasons why Hartzell cooling tower fans have "taken the petroleum industry by storm." More and more, specifications are written simply: "Hartzell fan." There is no equivalent.

Mail the coupon below for complete information, or write for our Cooling Tower Bulletin 1501.

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Company _____

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PROPELLER-TYPE FANS • BLOWERS
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ENGINEERING OFFICES IN PRINCIPAL CITIES

Only B. F. Goodrich rotary drilling hose has all these features

Stronger, more flexible, longer lasting, with exclusive Permalock coupling

Here's a hose that can drill under high rock and gas pressures, that your crew can treat rough, that will keep your rig on the job with a minimum of hose trouble.

Extra strength for deep drilling

Two spiral-wrapped plies of high tensile cable wire, plus eight plies of sturdy fabric give B.F.Goodrich Highflex hose extra strength for extreme bottom hole pressures. Qualifies for Grade C (5000 lb. test pressure) American Petroleum Institute. As an extra protection against bending stress at the coupling, hose ends are reinforced with additional layers of wire and fabric. This extra strength means no hose "blowouts"—added safety for your crew and rig.

Flexible, easy to handle

For all its toughness, this hose is still the most flexible one made for heavy-duty service. It's easy to attach to the rig, to move from one well to another, and it coils without kinking or "snaking".

Abrasion-resistant, tough cover

Because it's made of the highest grade, abrasion-resisting rubber, the cover on Highflex hose has strength to spare even when handling is rough. Its thick, tough cover resists gouges, scrapes, tears. Year round exposure to sun, wind, and rain will not harm it.

Oil won't rot tube

Oil in the mud will not cause swelling or rotting of tube. Also abrasion resisting.

Saves waiting

B. F. Goodrich Highflex rotary drilling hose with exclusive Permalock couplings is available at leading supply houses in the major drilling areas. However, should your local supplier be temporarily out of stock when you call, you can get the BFG hose you need any time—day or night—from one of these B. F. Goodrich warehouses: Dallas, Houston, Odessa, Oklahoma City, and Tulsa. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Oil Field Products BY
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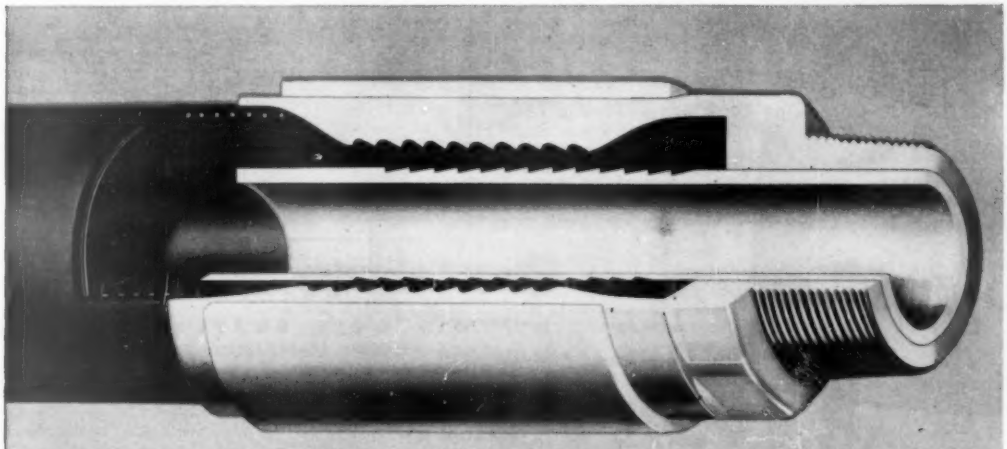
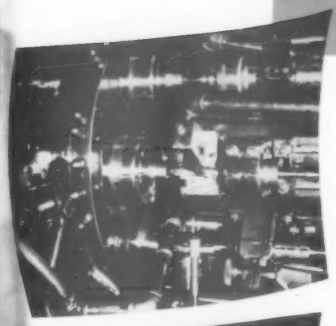
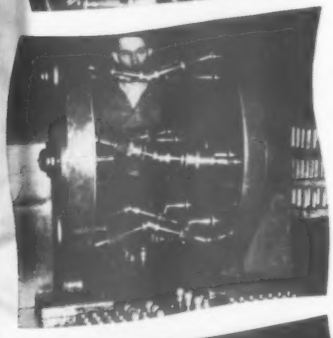


Exclusive Permalock coupling—Much lighter, more compact than other types of couplings. Allows greater hose end flexibility. Same inside diameter as hose, assuring full flow. Will not move out of position under highest drilling pressures. Guaranteed to be leakproof.

Is there any real difference in Balls and Seats?

...emphatically YES!





1. IN MACHINING AND HEAT-TREATING OF SEATS. "Oilwell" seats are machined and drilled to exact tolerances on automatic machinery—then heat-treated in electrically controlled and heated furnaces with controlled atmosphere to produce physical properties that are uniformly correct, before lapping.

2. IN AUTOMATIC LAPPING OF BALLS AND SEATS. "Oilwell's" technical engineers have designed an exclusive lapping process that automatically assures extremely accurate matings of each ball-and-seat set.

3. IN ACCURACY OF CONTOUR AND SIZE OF BALLS. "Oilwell," like most ball-and-seat manufacturers, buys balls by specification from specialists in ball manufacture. Balls are carefully checked by "Oilwell" for size and perfection of spherical contour . . . and thoroughly tested under pressure with their mating seats before packaging.

Unwrap any "Oilwell" ball-and-seat set and notice how snugly the ball and seat fit together. Contact surfaces between the two parts approach perfection from "Oilwell's" precision lapping . . . and seat bodies are finished inside and out to extremely close tolerances, well within the strict limits of A.P.I. specifications.

In addition, "Oilwell" balls and seats are available in several materials which have the proper chemical composition and physical characteristics to give you maximum performance under various service conditions.

	MATERIAL	HARDNESS	RECOMMENDED SERVICE
Type T	Tool Steel	Best	Extremely resistant to abrasion where corrosion is not a problem —the industry's favorite for low-cost service.
Type C	Hardened Stainless Steel	Good	Top quality low-metalloid stainless, has good resistance to both abrasion and corrosion.
Type K	Monel	Medium	Has excellent corrosion resisting properties with average resistance to abrasion—non-magnetic.
Type B	Bronze	Low	Hardened aluminum-bronze, non-magnetic with considerable corrosion resistance (brine) at low cost.
"Nolloy"	Extra Hard Stainless Steel	High	High hardness stainless steel ball and seat combination for corrosive wells, with considerable abrasion resistance—unsurpassed for general service.

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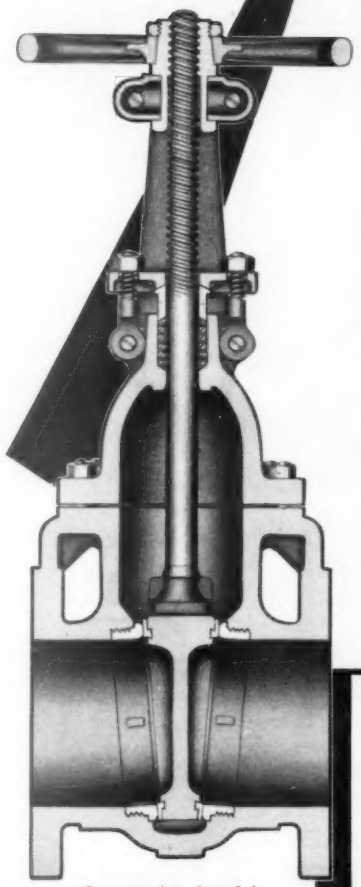
CRANE *Ni-Resist*

CAST IRON GATE VALVES

Here is a line of "cast iron" gate valves with a special talent for resisting corrosion, erosion and wear. Use them with safety where the strength of ordinary cast iron is adequate—in soda and sulfate pulp mill service—on creosote lines in wood treating processes—for handling sour distillates and crudes in petroleum refining—and many similar services.

Clue to the extra staying-power of Crane Ni-Resist Cast Iron Valves is in their make-up (approximately 14% nickel, 2½% chromium, and 6% copper)—and in their 18-8 Mo Alloy Steel stem and seating faces. Not to be overlooked is the fine Crane design that gives you a strong body and bonnet without excessive weight, a well-proportioned stem with precision-cut threads, a sturdy yoke, and the dependable disc-stem connection that assures smooth operation and tight seating of the solid wedge disc. Ask your Crane representative for full details, or see your Crane Catalog.



Cross-section 4 to 8 in. sizes; bolted bonnet joint; flanged ends.

THE CRANE NI-RESIST LINE

Working Pressures:
Cold Water, Oil, or Gas, Non-shock
Screwed Valves—225 pounds
Flanged Valves—200 pounds

Available in sizes ½ to 8 in. All have solid wedge disc, with outside screw and yoke. Sizes ½ to 3 in. have clamp type bonnet joint and one-piece bolted gland. Sizes 4 to 8 in. have conventional bolted bonnet joint and two-piece bolted gland.

No. 1671 with Bolted Bonnet Joint, Flanged ends only. Sizes 4, 6 and 8 in.

No. 1670 with Clamp Type Bonnet Joint with screwed ends. Sizes ½ to 2 in. Also with flanged ends 1 to 3 in.

The Complete Crane Line Meets All Valve Needs. That's Why **More Crane Valves Are Used Than Any Other Make!**

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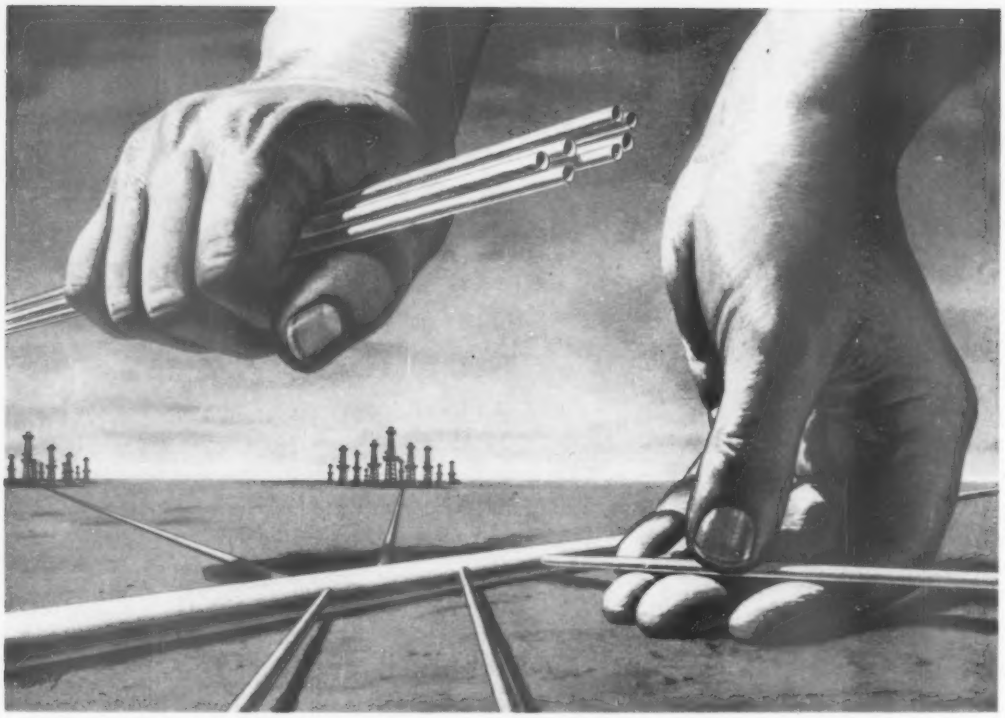

Helping to feed a giant appetite—on time!

To help satisfy the nation's giant, and growing, appetite for natural gas, hundreds of new gathering lines are rapidly being installed to feed the huge transmission lines.

To help keep these vital gathering line jobs on schedule, line pipe men increasingly rely on Kaiser Steel pipe. Thousands of miles of Kaiser Steel pipe are installed—all of it delivered *on time*.

You can be sure of such prompt, dependable delivery in the western two-thirds of the United States.

Add to this Kaiser Steel's *uniform quality* and *wide range of sizes* and it's clear why . . .

It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅛" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

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UNIQUE PROTOTYPE DEVELOPMENT

. . . using advanced Engineering Techniques

Design and construction of 400 gallon capacity vessels to contain liquefied gases near 400 degrees below zero F was a recent example of ADL prototype development.

Reducing costly evaporation losses took high-vacuum insulation at a pressure of 1×10^{-6} mm Hg, as well as knowledge in extreme low temperature engineering — even under severe transportation heat leaks of only 1/12 watt/sq. ft. occurred.

ADL experience in many areas of science and engineering produced this unique prototype.

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Arthur D. Little, Inc., has blended its scientific and engineering skills in the Mechanical Division to provide industry with a unique service . . . prototype development of equipment requiring a high level of engineering. Scientists in the fields of chemistry, physics, metallurgy, mathematics, biology, electronics and technical economics can be called on as required.

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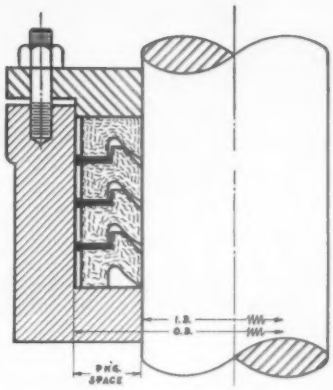
Introducing...

The R/M "Vee-Square"*

A NEW TYPE OF PACKING RING FOR MUD PUMPS

Combines the advantages of unit type packing rings with the automatic sealing of V-ring design. Special cushioned edge—does not require sensitive gland adjustment.



This new type of packing ring, the R/M "Vee-Square," has been thoroughly tested in a number of American oil fields and is now being offered for all sizes and types of slush pumps.

Designed and manufactured by Raybestos-Manhattan, Inc., the R/M "Vee-Square" insures better pump performance and longer rod life.

The R/M "Vee-Square" combines the positive, nonyielding properties of solid packing with the automatic sealing of V-ring design so widely used. The soft rubber cushion between the rings stops "blow-by."

Ordinary V-ring design requires accurate, finger-tight adjustment . . . something it is hard to get in heavy equipment. R/M "Vee-Square" requires tight gland takeup.

Try R/M "Vee-Square" on your mud pumps and see for yourself how your rod costs are reduced.

3 PRINCIPLES OF R/M "Vee-Square" DESIGN

A. Soft rubber ring is an integral part of R/M "Vee-Square." Soft rubber squeezes against rough wall of stuffing box, and insures perfect fit *with proper sealing pressure against rod.*

B. Solid portion is square. Absorbs gland pressure without transferring unneeded pressure to rod. Keeps packing from rolling and riding rod.

C. V-design provides automatic sealing against rod.

WHAT OTHER PACKING RING HAS THESE 7 ADVANTAGES?

1. Rods last longer because of minimum friction
2. R/M "Vee-Square" is self-sealing packing — does not require sensitive gland adjustment
3. Easily installed
4. Rings easily assembled without special adapters, all rings identical
5. "Vee-Square" prevents "blow-by" between packing and stuffing box wall
6. Tight gland pressure keeps packing from rolling
7. "Vee-Square" can't ride with rod

Write for your copy of the new R/M "Vee-Square" bulletin

*Patent pending

IT'S PACKED WITH SATISFACTION WHEN IT'S PACKED WITH R/M

R/M PACKINGS

RAYBESTOS-MANHATTAN INC.

PACKING DIVISION, MANHEIM, PA.

FACTORIES: Manheim, Pa. • Passaic, N.J. • Bridgeport, Conn. • No. Charleston, S.C. • Crawfordsville, Ind. • Peterborough, Ontario, Canada

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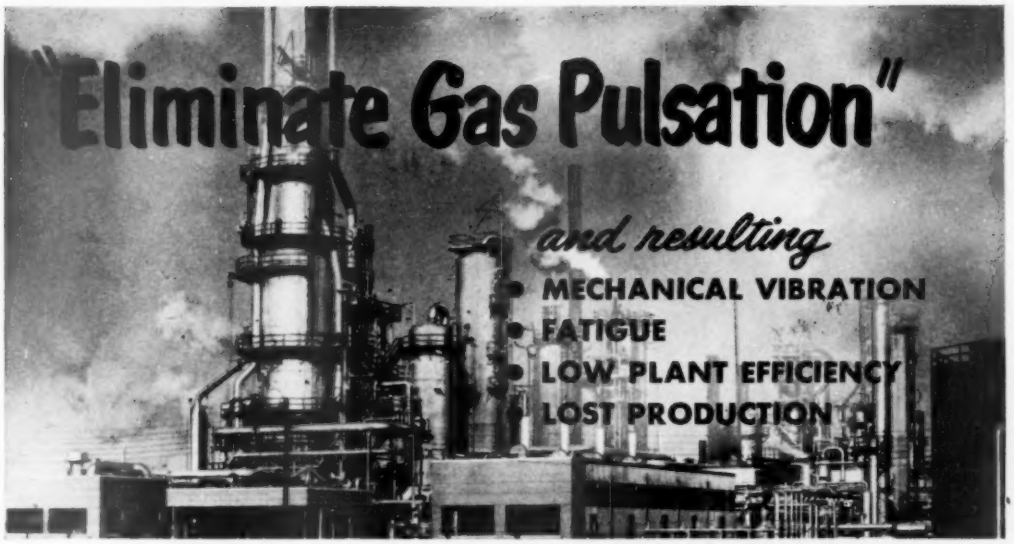
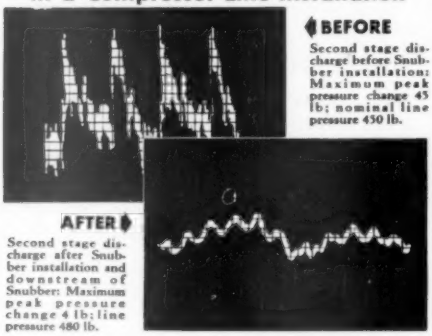


Solution to a typical Surge Problem in a Compressor Line Installation



BEFORE

Second stage discharge before Snubber installation: Maximum peak pressure change 45 lb; nominal line pressure 450 lb.

AFTER

Second stage discharge after Snubber installation and downstream of Snubber: Maximum peak pressure change 4 lb; line pressure 480 lb.

Send for your copy of a typical Burgess-Manning Pulsation Survey and Analysis Report

BURGESS-MANNING PULSATION SURVEY

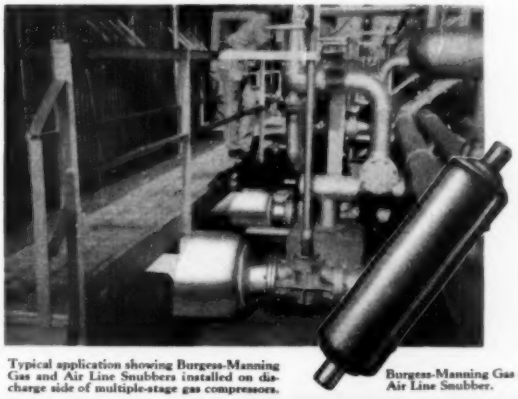
Burgess-Manning pulsation surveys are conducted by trained and fully experienced engineers with electronic equipment including pressure pickup (transducer), amplifier, and oscilloscope. The pressure transducer is coupled as close to the gas stream as possible and faithfully reproduces in voltage the pressure changes in the pipe. This voltage is conducted to a three stage amplifier and then to the oscilloscope screen. Photographs are taken of the screen as a record of surge. Data is taken and recorded. Maximum peak pressure change is calculated. Report is prepared. Recommendations are made that best solve your problems.

CONSULT BURGESS-MANNING ENGINEERS

Gas pulsation in compressor piping systems often results in excessive vibration and material fatigue. This, in turn, necessitates constant maintenance in piping and equipment resulting in lower over-all plant efficiency.

Your compressor system pulsation problem can be solved by Burgess-Manning Company engineers. This division maintains a field service to make surveys and analyses of flow conditions in pressure piping. Trained engineers correlate this data for reference in making Burgess-Manning Gas and Air Line Snubber recommendations for new plants as well as for existing plants.

Write for your copy of a typical case history in which Burgess-Manning engineers solved a tough problem.



Typical application showing Burgess-Manning Gas and Air Line Snubbers installed on discharge side of multiple-stage gas compressors.

Burgess-Manning Gas & Air Line Snubber.

BURGESS-MANNING COMPANY

1203 Dragon Street
DALLAS, TEXAS

Chicago, Illinois — Libertyville, Illinois

REPRESENTATIVES: Houston • Tulsa • Los Angeles • St. Louis • New York

Better ANY WAY YOU LOOK AT IT...

AMERICAN

"Every Angle" DIAL THERMOMETER

The American "Every Angle" Dial Thermometer is easy to install and turn to any position for accurate face-to-face readings. Specify the "Every Angle" — indoor or outdoor design — and this unbeatable feature combination is yours:

DEPENDABLE ACCURACY. The "Every Angle" Thermometer is made of precision-machined, non-corrosive materials and operates by vapor pressure. It is precisely calibrated against certified standards to assure the most critical reading in the upper third of the dial, where the graduations are farthest apart.

CONVENIENCE. Dial face can be rotated 180° and tilted 180° for accurate reading at the most convenient angle.

WEATHER-PROOF DESIGN. *Screw-type ring* with tight-fitting gasket for weather-proof outdoor service; *slip ring* design for indoors.

REINFORCED MOUNTING. Heavy-gauge swivel hinge has a *stainless steel kingpin.* Reinforced connection between hinge and bulb. Greater strength and corrosion resistance, long service life!

EASY INSTALLATION. Socket connections have compression-type bushings. No costly jigs needed — connection easily welded to tanks or other irregular-shaped equipment.

Ask your Distributor to help you select the American "Every Angle" Dial Thermometers with the proper temperature ranges for your needs. Phone or write him today.

SPECIFICATIONS

NON-CORROSIVE DIAL CASE: Non-corrosive aluminum with smooth black finish. No protruding screw heads. Nickel-plated brass cup houses coiled capillary tubing.

DIAL: 3½" diameter. White with black figures. **POINTER:** Black, adjustable. **FRONT:** Heavy plate glass. **MOVEMENT:** Bronze or stainless steel. **BULB AND STEM:** Stainless steel. **SIZE CONNECTION:** ½", N.P.T. **STEM-LENGTHS:** 3", 5-5/16", 12", 18" and 24". **SEPARABLE SOCKETS:** Bronze, carbon steel or stainless steel.

STANDARD RANGES

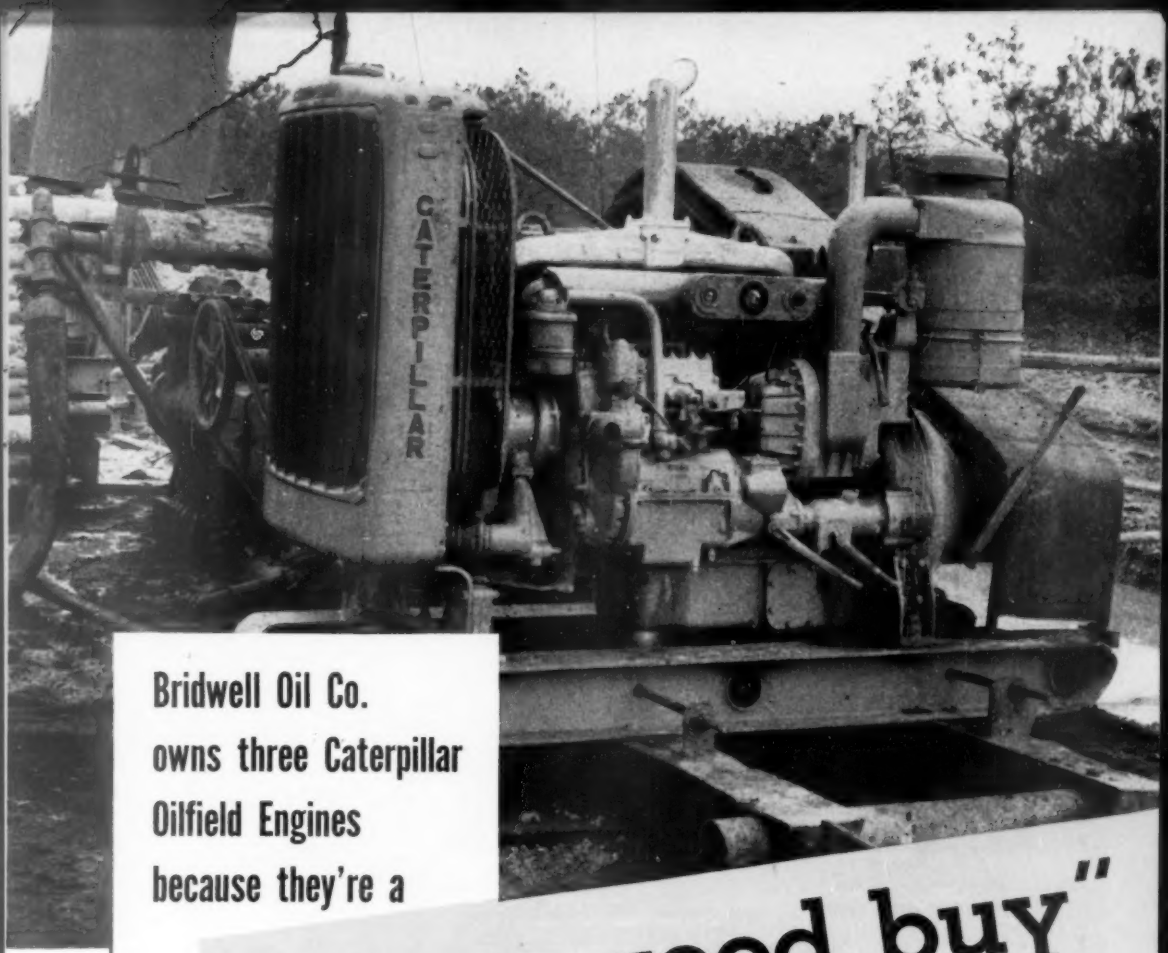
Fahrenheit	
—60 to 20°	30 to 300°
—20 to 120°	100 to 300°
40 to 140°	90 to 350°
30 to 180°	190 to 390°
20 to 220°	260 to 450°
Centigrade	
0 to 100°	40 to 150°

YOUR INDUSTRIAL DISTRIBUTOR makes it his business to see that you get the best possible equipment. That's why he handles only products of proved quality and dependability — like Manning, Maxwell & Moore products.

AMERICAN INDUSTRIAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



Bridwell Oil Co. owns three Caterpillar Oilfield Engines because they're a

"darn good buy"

The Caterpillar D337 Oilfield Engine pictured above is one of three Cat Engines used by the Bridwell Oil Co. of Wichita Falls, Texas, on oil drilling operations in Jim Smith County. It powers an Ideal mud pump. The reason this new 250-HP, maximum, unit was purchased was the outstanding record made by two D4600 Engines. One of them drives a Wilson-Snyder pump, and the other powers a compressor and pumps water to the drill rig. They have operated continuously since 1935 with only one overhaul! Enthusiastic boosters for Cat equipment, the Bridwell Oil Co. also owns a Caterpillar D6 Tractor with Bulldozer.

Many drilling firms have found that it pays to standardize on rugged Caterpillar equipment for years of dependable, economical performance. They've found a valuable "plus," too, in round-the-clock service from able, well-stocked Caterpillar Dealers. To cut your operating costs, specify Caterpillar Oilfield Engines and Electric Sets for *your* rigs. See your local dealer soon.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

Oilfield Engines

1922—First power line carrier current equipment installed.

1944—First application of frequency modulation to power line carrier current equipment.

1947—First microwave relay system in commercial operation.

1875—Elihu Thomson, one of the founders of General Electric, transmitted and received wireless signals for a distance of about a hundred feet.

1915—Sample radio-telephone trangmitter installed on two U. S. battleships and used in 1916 Spring Naval Maneuvers.

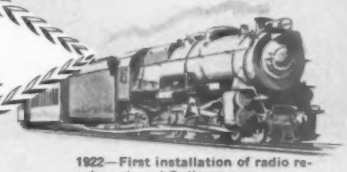
1931—Sonic locator developed for use by ships in fog. It was the first step toward radar.

1937—First application of radio communication aboard fireboats. New York City Fire Dept. installation.

1878 75 1953

YEARS OF ELECTRICAL PROGRESS

1923—First airmail plane radio communication equipment installed and tested.



1922—First installation of radio receiver aboard Pullman cars.

1927—First front-to-rear railroad communication equipment installed.

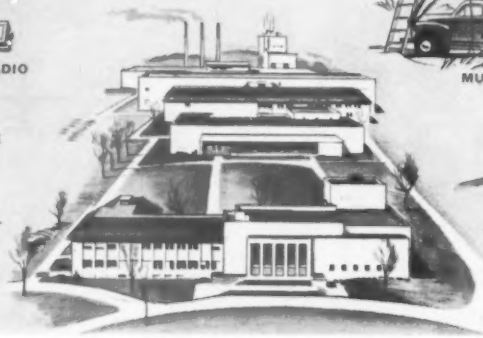
and today...

INDUSTRIAL 2-WAY RADIO

MUNICIPAL

POLICE

FIRE DEPTS.



CONSTRUCTION

GE *Matchless Heritage* IN COMMUNICATIONS ENGINEERING

From the several companies formed to manufacture Edison's historic electric lamp, G.E. is today a company with 200,000 products . . . engaged in 13 of the 21 basic manufacturing industries. Its tremendous human and material resources are constantly working to give you a better life with new and improved products.

Communications in your business is the outgrowth of many G-E "firsts." Today — using G.E.'s *high-performance, low maintenance* radio units—industry, utilities, and municipal government reap these benefits: instant reliable communication for increased productivity . . . area control . . . citizen protection.

For information write: *General Electric Company, Section 813-19, Electronics Park, Syracuse, New York.*

GENERAL ELECTRIC

FUELING... for fun or a fight

At the schoolground or in the stratosphere, flying takes fuel... whether it's only a thimbleful for a model or a tanker load for a Stratojet. Despite the difference in fuels, both may have come from the same oil well. Transforming crude into such varied types of fuel is a miracle worked by the petroleum industry... with an assist from chemistry.

Closely associated with the petroleum industry, Mathieson—now in its 60th year as one of America's major chemical companies—today supplies petroleum processors with more basic chemicals than ever before... such products as caustic soda, ammonia, sodium chlorite, sulphuric acid, diethylene glycol, triethylene glycol, dichloroethylether.

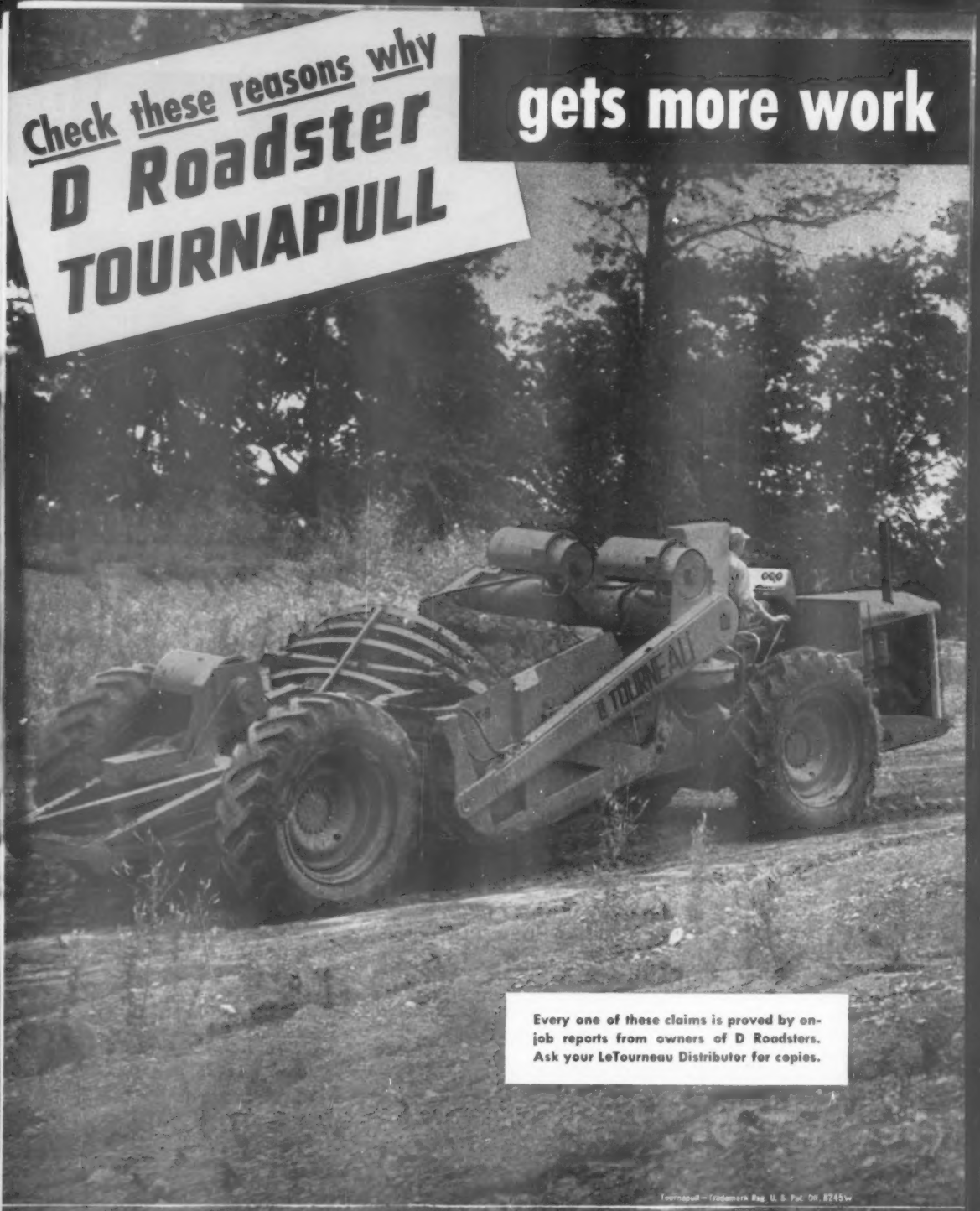
A dependable source of supply for essential raw materials is always important. If your production requires any of these chemicals, you may be able to buy *to better advantage* by consulting with us now. Mathieson Chemical Corporation, Baltimore 3, Maryland.

97498A

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Check these reasons why D Roadster TOURNAPULL gets more work



Every one of these claims is proved by on-job reports from owners of D Roadsters. Ask your LeTourneau Distributor for copies.

Tournapull—Trademark Reg. U. S. Pat. Off. 8245w

R. G. LeTourneau Inc.

PEORIA, ILLINOIS

done at a lower net cost per job

(1) Modern rubber-tired speeds for fast digging and quick moves

This fast-stepping unit has a top speed of 28 m.p.h. You shift gears fast through the 5-speed, heavy-duty, sliding-gear transmission; has positive electric steer for accurate control and snappy maneuvering. You get big, fast tires instead of a crawler's tracks. With "D's" 28 m.p.h. high speed, you get definite production and cost advantages on *both* long or short hauls as well as on odd-job and production assignments.

(2) Less downtime for weather, less slowdown for soft and slippery going

Big, low-pressure tires improve traction. Two-wheel prime mover wastes no tractive weight on extra steering wheels. Power-proportioning differential applies up to 4 times more power on wheel having firmest footing. Positive power steer shifts footing as needed for a better pull. All these speed up work cycles, cut downtime for bad weather.

(3) Easier to keep busy, handles odd jobs or production dirtmoving

7-yard D Roadster is ready to go anytime at 28 m.p.h. to handle scattered one-machine jobs such as back-sloping, clearing slides and other small-yardage jobs. It also is an effective big-yardage dirtmover when pusher-loaded in fleet operation. This flexibility gives you more effective use of manpower and equipment for your maintenance and construction operations. Both a Flat-Bed and Bulldozer blade increase year-round application and make it most profitable tool in your equipment inventory.

(4) You save on job-to-job travel over pavement . . . cross country

Your operator drives the Roadster job-to-job over the highway under its own power (and carrying its own supplies). This saves cost of loading, blocking, trucking, low-boy, unloading, plus wasted waiting time. In addition, because the "D" can work-and-run to another one-machine assignment any time, any place, you can speed up maintenance service on your jobs or anywhere around the country . . . any time of year. 25 miles is only about an hour away. Unlike crawler's tracks, big rubber tires do not damage road surface.

(5) Faster, easier to operate . . . less fatigue

Good operators are always available for the D Roadster. Push-button electric control makes it faster and easier to control. Big, low-pressure tires, air foam cushioned seat, plus quieter operation eliminate a lot of operator fatigue. This makes for safer, faster, steadier operation, less manpower turn-over. These advantages plus better operator co-operation mean a substantial increase in yards moved and more jobs completed throughout the year. Contact your LeTourneau Distributor for all the facts . . . there's no obligation.

Attachments and interchangeable EQUIPMENT:

REAR-DUMP HAULER

7-TON CRANE

FLAT-BED HAULER

BULLDOZER BLADE

Send for complete facts to: R. G. LeTOURNEAU, INC., Peoria, Illinois

Please send us: ☐ Specifications ☐ Job performance reports on 7-yd., 28 m.p.h. D Tournapull

Name..... Title.....

Company..... Street.....

City..... State.....

Also interested in D Tournapull for use with: ☐ Flat-Bed Hauler ☐ Bulldozer ☐ Rear-Dump Hauler ☐ 7-ton Crane

LETOURNEAU LET EQUIPMENT

Oil makes him an independent businessman . . .

His office is on America's highway. His customers sit in the driver's seat. Of the 200,000 service stations in the U. S. about 95% are independently owned or operated. As independent business men, their job is to keep America's wheels moving. Texaco Dealers operate in all 48 states — maintain their position with the aid of outstanding petroleum products plus their own dealer know-how. Here indeed is a striking example of free enterprise at work in a highly competitive economy.

The Texas Company

TEXACO

LUBE OIL TEMPERATURE: NORMAL

In spite of high speeds and heavy duty

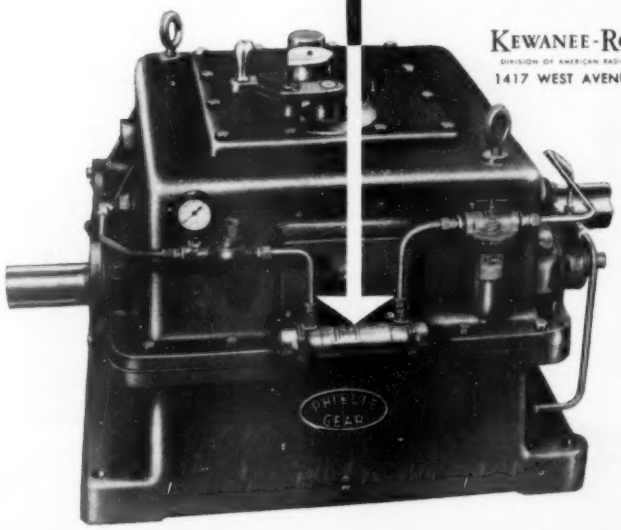
a Ross exchanger sees to that

Heavy shock or impact loading, high speeds or heavy duty are no threat to lube oil temperatures in Philadelphia Change-Speed Units. *A Ross Exchanger sees to that!*

Factory-installed by Philadelphia Gear Works, Inc., this compact Ross Exchanger keeps oil temperature within recommended limits. As a result, gears and bearings are never lacking of sufficient lubrication at required viscosity.

The use of Ross Type BCF Exchangers for this application, as for numerous others, has unique advantages for both machinery builder and user. Among them: Enduring all-copper and copper alloy construction; Completely standardized, pre-engineered designs to expedite procurement and simplify installation.

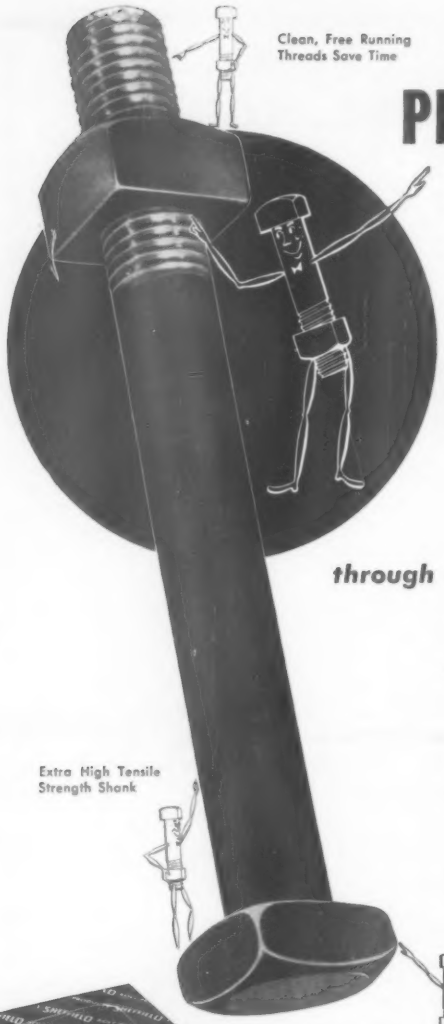
For complete information on this, the most specified of exchangers, write for Bulletin 1.1K5.



KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1417 WEST AVENUE BUFFALO 13, N. Y.

ROSS
exchangers

Serving home and industry
AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON



Clean, Free Running Threads Save Time

PERFECT TEAMWORK

NUT-TO-BOLT FIT is a matter of close-tolerance precision in Sheffield Bolt and Nut manufacture. That's one reason why Sheffield Bolts give more gripping power; hold stronger, longer.

There IS a BIG DIFFERENCE *in bolts!*

It's STATISTICAL QUALITY CONTROL through Every Step of SHEFFIELD MANUFACTURE

HERE'S UNIFORMITY you can count on—quality you can be sure of—in every bolt, every carton, every shipment. Sheffield quality starts with special analysis steel, and it's rigidly checked and controlled right down the line to the finished product.

HERE'S HOW: Inspection data is recorded at every quality control step in manufacture. This data is analyzed by statistical methods similar to those used in aircraft production. Any deviation from Sheffield's high quality level shows up right now, and is corrected.

PACKAGE APPEAL: Not only for neat display, but for faster and easier identification of sizes and filling of orders, Sheffield's trim new carton is a stand-out. It's a real selling and handling help.

Extra High Tensile Strength Shank

Tough, Precision-Shaped Heads Defy Wrench Slippage

New Eye-Appeal, and Easy Order Filling with this SHEFFIELD HINGED-COVER CARTON

SHEFFIELD

Quality Starts with SHEFFIELD-Made Special Analysis Steel...

SHEFFIELD STEEL CORPORATION

HOUSTON KANSAS CITY TULSA

SUBSIDIARY OF ARMCO STEEL CORPORATION

DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

January ★ One of a Series of Interest to the Petroleum Industry ★ 1953

When the Customer Says

The chances are it is caused by some factor other than gasoline quality.

To point up the seven common causes of knock – other than gasoline quality, Du Pont recently made up a folder on the subject.

Although originally designed to be handed out during dynamometer demonstrations, the folder proved to have such popular appeal that it has now been made available separately to oil company marketing groups for distribution to dealers.

For sample copies and information on how to obtain the folder, write the Wilmington office or any of the district offices of the Du Pont Petroleum Chemicals Division. Ask for the folder, "When the Customer Says 'Knock'."

Wildcat . . .
The Educational Game of Drilling Facts and Risks

About a year ago a game based on actual drilling statistics was developed and patented by the Du Pont Petroleum Chemicals Division. This game called "Wildcat," while entertaining, shows in a dramatic manner the high cost and the financial hazards of the search for oil.

The players act as individual operators. Starting with $900,000 they must lease properties, drill wells, produce and market oil—as well as pay the taxes on their profits. The odds in the game are based on national averages. Taxes paid reflect actual rates and depletion allowance is included.

When first developed the cost of making the game was believed too great to allow wide distribution. Costs have now been reduced to the point where packaged, personalized games can be made for about one-sixth the original quoted price. This is cost of manufacture only. Necessary plates, dies, etc. are available without charge through the Petroleum Chemicals Division.

The first order for "Wildcat" has been placed and shipment received. Sample games are available to petroleum companies. Your Du Pont service representative can obtain a sample for you.

Suggested uses for the game are as an employee relations or public relations tool, or as part of a marketing program where a giveaway is desired.

The Service Station And The Motorist

National survey of consumer buying habits documents the Who . . . How . . . What . . . When and Where of service station purchases

A survey of buying habits at service stations has just been completed for the Du Pont Petroleum Chemicals Division. It was made as part of continuing market research studies. To date it is the largest single effort of this program. It is national in scope and contains five separate parts. The first is based on interviews in car-owning households. The other four are seasonal observations at service stations.

Pictured above is **E. HEARN SIMPSON,** Sales Manager of the Du Pont Petroleum Chemicals Division, at whose suggestion the survey was made. This picture points up the voluminous nature of the information collected to date.

The purpose of the survey was to document nationally and by four major marketing areas, the purchase patterns, attitudes and trends on the part of service station customers. It was designed to report accurately and impartially, information concerning the motorists' knowledge of gasoline brands and grades. Services asked for, given and expected were checked. Buying habits of oil and TBA items were probed.

All were analyzed and compared on the basis of four broad marketing areas, Northeast, South, Central and West, and by sex, income and age of the respondents. The service station observations were

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED

Buying Survey

catalogued by age and price of car. As such, we believe this survey to be the most comprehensive, penetrating and accurate ever undertaken by any segment of the petroleum industry.

PARTS TO BE PUBLISHED

From time to time, as information is collated and summarized, various portions of the survey will be printed by Du Pont and distributed to oil company marketing groups. The first of these reports is now being made ready for publication. It covers in brief form the selection of a service station and loyalty to the service station.

The reactions of dealers and station attendants, as well as motorists, were studied and are reported in the survey. To assure the utmost accuracy, the information was collected by two different methods – by interview and by observation.

SEASONAL BREAKDOWN

All of the interviews and observations were made by trained observers. More than 3,100 home interviews and approximately 24,000 observations of individual motorists at 1,193 service stations have been completed. The observations were spread over a year with about 6,000 being done in each of the four seasons – Spring, Summer, Fall and Winter.

The household study provides a base for measuring what people *say they do, why they do and think* certain things when buying gasolines. The station observation study shows what motorists *actually do* when buying gasoline. It also provides an insight into the kind of job the service station attendant does in selling gasoline, oil and TBA; and in providing customer services.

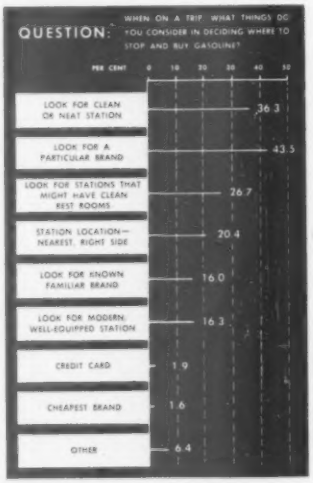
The 1,193 service stations and the 3,100 automobile-owning households were selected by the area sampling method. This is the same selective method that is used by the U. S. Bureau of the Census and by the Bureau of Internal Revenue as being the most accurate and representative. An indication of this accuracy is shown by the almost exact correlation between the makes of cars owned by families interviewed and the total car registration figures.

VOLUMINOUS STUDY

Six volumes totaling almost 800 pages make up the household interview reports. For ease of study these have been divided into six broad subjects:

1. Selection of the service station and station loyalty.
2. Brand name recognition and loyalty to brand.
3. Knowledge of gasoline grades and reasons for purchase.
4. Price, credit cards and charge accounts.
5. Oil and TBA purchases.
6. Services wanted by the motorist, asked for by the motorist, and given by the dealer.

Each of the four service station observations requires two volumes to report the findings. These add to and check the information obtained during the interviews.



TRAVELERS look for *brands* and clean *stations*. Regardless of the grade they buy, it's your brand that brings them in.

INFORMATION AVAILABLE

The full and complete information obtained by the survey is recorded on IBM cards and held for Du Pont by National Analysts, Inc., of Philadelphia, a subsidiary of Curtis Publishing Company. In this manner various cross checkings can be made as, for instance, services expected at west coast service stations by men between the ages of 35 and 50 years. Or, to provide an additional information breakdown such as urban vs. rural gasoline buying habits.

While this indicates the great scope of the survey, it also shows the difficulty volume-wise of assembling a complete survey for delivery to persons interested. However, material in the survey is available to the petroleum industry. Questions or requests for information should be addressed to any of the offices of the Du Pont Petroleum Chemicals Division.

LITERATURE AVAILABLE

Here is a partial listing of the bulletins, reports, booklets and aids available to you through your Du Pont Petroleum Chemicals Division district office:

Safety for the Small Refinery – A 42-page book on how to set up an effective small refinery safety program . . . . . Serial A-2848

Tank Talk – A 52-page, easy-to-understand safety booklet for tank-cleaning crews . . . . . Serial A-1134

Stability of Present-Day Gasolines – A 12-page paper on the value of storage tests—as compared with induction period—for determining stability of modern gasolines . Serial A-3199

MOVIES AVAILABLE

Pipeline on Wheels—A 26-minute, full-color movie on tank truck safety. Suitable for both training and public relations purposes.

What Makes A Gasoline Good—An 18-minute cartoon movie in color. Presents the story of how high quality gasoline is made in easy-to-understand form. Ideal for dealer training meetings.

In addition to the above, Du Pont makes available a special library of films of particular interest to the petroleum industry.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

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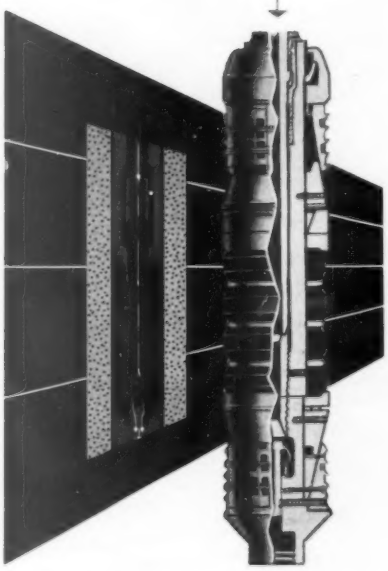
POSITIVE FLUID SHUTOFF FROM EITHER DIRECTION WITH

HALLIBURTON'S DM AND DC SQUEEZE PACKERS



DM — drillable magnesium alloy for squeezing and *temporary* Bridge Plugs

DC — drillable cast iron for squeezing and *permanent* Bridge Plugs

Halliburton's *exclusive back pressure valve* of the sealing cup type gives you a positive seal even when an obstruction as large as ⅛" diameter is lodged between the valve and the seat! This is just one of many reasons why these precision-engineered Squeeze Packers are famous for dependable performance in *any* well regardless of depth and pressure...

Simple, Positive Mechanical Action... Halliburton Squeeze Packers are set by simply rotating tubing to the right. An upward lift on tubing sets slips, *releases back pressure valve* to closed position, and expands packing element against the casing to form a perfect seal. A continued upward lift on tubing releases the *circulating valve* from packer, and circulation can be established immediately.

The tubing and circulating valve are free from packer before squeezing begins. There are no threads to unscrew after cement is placed! To squeeze, simply lower tubing so that the circulating valve can re-enter the packer seat and seal. Two seals form between end of circulating valve and packer which prevent cement from leaking out through the top of the packer.

When finished, tubing and circulating valve are withdrawn, and the excess cement is reversed out, leaving the Packer to be drilled out or remain in the well as a permanent Bridge Plug.

Depend on the Packers Built by the World's Most Experienced Cementers... Get the best experience that money can buy... insist on Halliburton DM and DC Squeeze Packers! Your nearby Halliburton representative can supply you in minutes around the clock. Or write Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN ADVANCED CEMENTING TECHNIQUES!

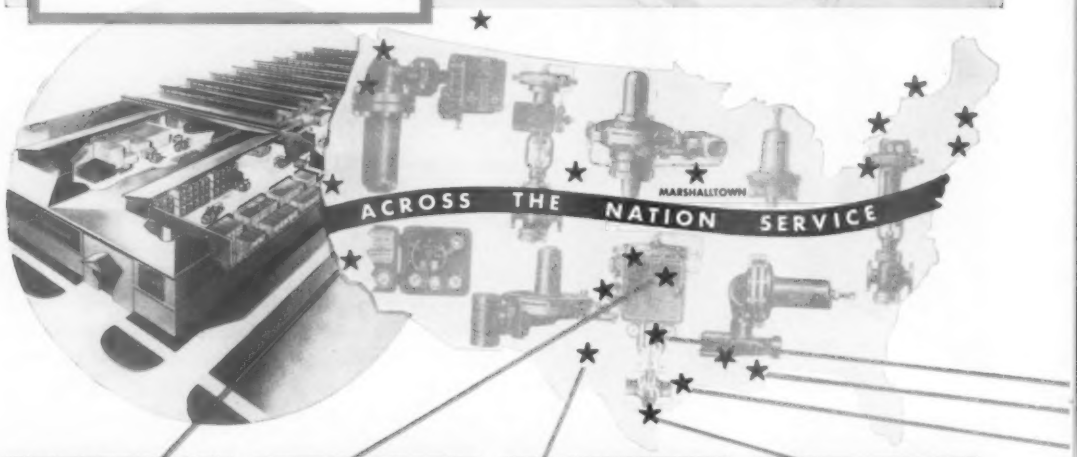
FISHER®

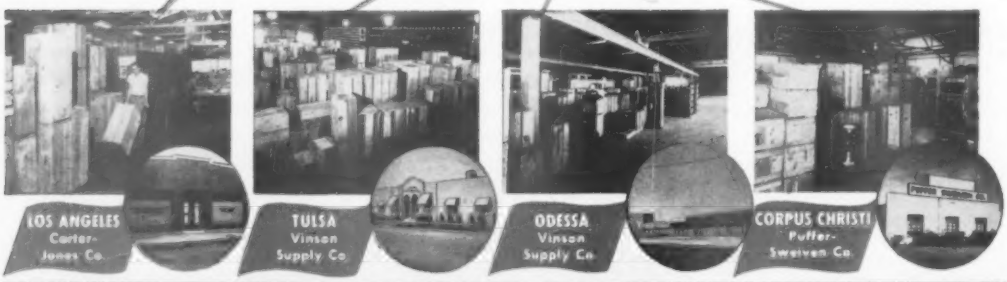
FACTORIES...AND FIELD STOCKS

MARSHALLTOWN, IOWA

• *Above*—**Factory No. 1.** Over 220,000 sq. ft. of floor space. The industry's most modern plant. Here the world's largest production of pressure and liquid level control equipment is made possible by Fisher's unequalled research, design, engineering, testing and manufacturing facilities.

• *Below*—**Factory No. 2.** Over 50,000 sq. ft. of floor space. A major unit in Fisher's continuing expansion program of increased facilities and production.





FISHER PRESSURE REGULATORS • GAS REGULATORS
LIQUID LEVEL CONTROLLERS

ASSURE YOU DELIVERY

Where you want it!

When you want it!

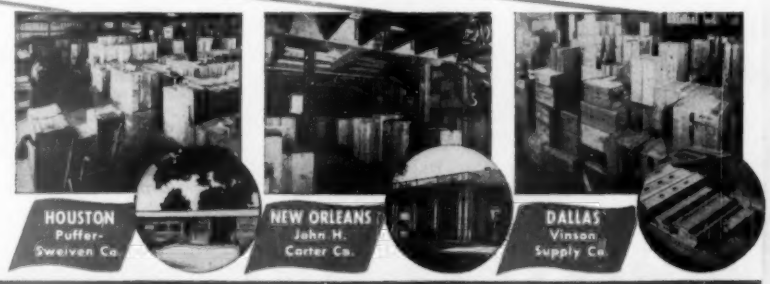
You are *always* close to a source of supply of Fisher *control valves, gas regulators, liquid level controllers* and *pressure regulators.*

Whether your problem is one of existing equipment—or an entirely new control application—the Fisher country-wide network of *19 strategically located field stocks* and *51 representatives*—with over *200 Fisher Service Engineers*—offers you *immediate* and *convenient* service on all your control requirements.

A few typical Fisher Warehouse Stocks of new equipment and replacement parts are shown below.

FISHER GOVERNOR COMPANY • MARSHALLTOWN, IOWA

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL



DIAPHRAGM CONTROL VALVES • PUMP GOVERNORS
LEVER AND FLOAT VALVES

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NOW AVAILABLE with *JET* *

- *DEEPER PENETRATION*
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SERVICE BRANCHES IN ALL ACTIVE AREAS
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FORMATION AND CASING TESTING
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Performance records prove.....

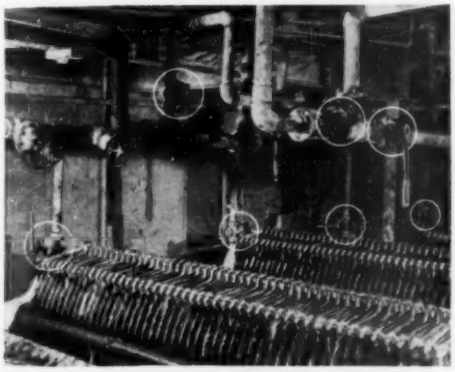
A pottery* in Ohio tried practically every type of valve on its "slip" lines, but the highly abrasive material, at 125 pounds pressure, ruined the average valve in a few months—in some cases, in a few weeks. Our engineers recommended HOMESTEAD Cam-Seald VALVES with special, hard-faced plugs and bodies. The pottery installed them on all "slip" lines in the plant.

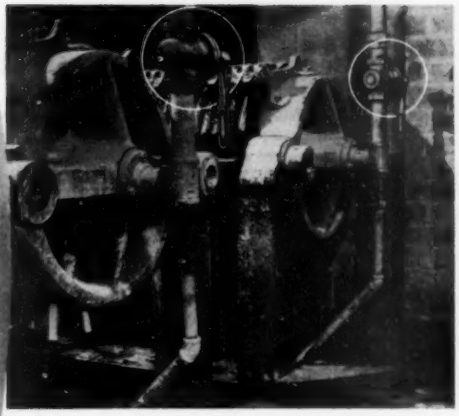
Performance records kept during the past several years show that the HOMESTEADS are lasting more than three times longer than any other valve previously used. Savings in replacement and maintenance costs repay many times over the first cost of the HOMESTEADS.

For more than 60 years HOMESTEAD VALVES have been licking equally tough jobs on scores of services in many different types of industries. Chances are there's a valve problem they can solve for you. Why not ask our engineers about it? No obligation.

*Name on request.

HOMESTEAD VALVES *are a* "Better Buy"





Write today for VALVE REFERENCE BOOK No. 39. No obligation. Consult Yellow Pages of Phone Book for local Representative.

HOMESTEAD
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"Serving Since 1892"
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CHASE ANTIMONIAL ADMIRALTY *(A patented alloy)*

If you want heat exchanger tubes that will stand up for years under tough conditions, remember... Chase Antimonial Admiralty* Heat Exchanger Tubes last longer! It's the antimony that does it!

These great heat exchanger tubes have enough antimony to resist dezincification. And antimony will not weaken the tube. The metal starts with the right grain structure and retains it... it stays tough and withstands the stresses of heavy duty assignments.

You'll do better with Chase Antimonial Admiralty Heat Exchanger Tubes! Send coupon for FREE Book.

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FREE CHASE BOOK discusses corrosion problems and selection of proper alloy for condenser and heat exchanger tubes.

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Please send me your free book on Condenser and Heat Exchanger Tubes.

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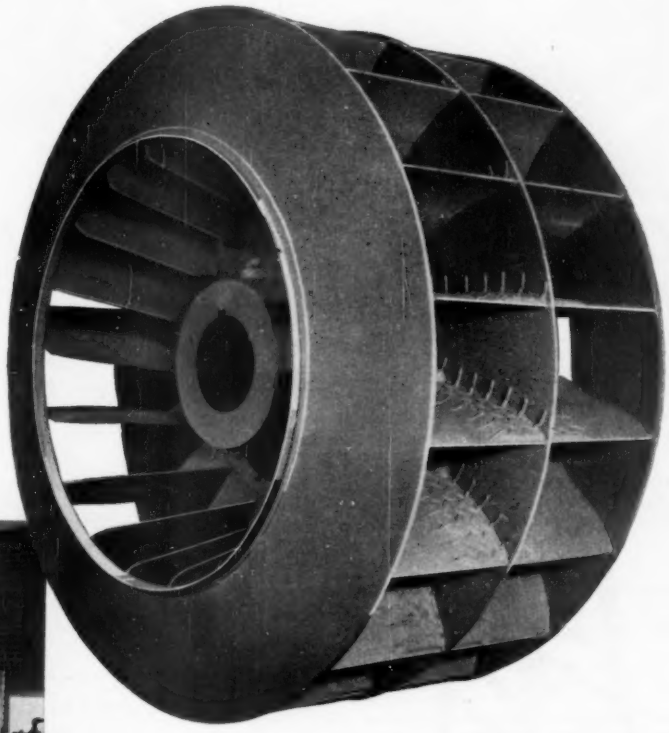
"Buffalo" *Tips on Getting Best Results With FANS*

How a WHEEL Helps to Cut POWER COSTS



The rotor of the "Buffalo" Double Width Induced Draft Fan moves a lot of hot, erosive, fly-ash in its job of getting maximum Btu's from your fuel. Now, this treatment is destructive, as combustion engineers know, and down-time in the boiler room can be expensive. Thus, the rotor that can stand up is going to cut power production costs.

Note the heavy plate used in the blades, center plate and flanges in the all-welded rotor shown (also available in riveted construction). Welded-on wearing strips lengthen blade life, and these may be built up again easily, whenever necessary. *Here's a wheel built to keep turning!* And it's just part of the long-life "Buffalo" Draft Fan construction, which includes oversize shafts, highly serviceable bearings, rugged housings of bolted sectional design for accessibility. If you are looking for lower steam generation costs, look into "Buffalo" Draft Fans. Write for Bulletin 3750 today!

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

525 BROADWAY BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

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a few words about alloy steels

or... 3 x 3 = 1

one best answer to your alloy steel problem . . . one best answer supplied by the 3 members of Republic's 3-Dimension Metallurgical Service . . . the Field, the Mill, and the Laboratory Metallurgists . . . after looking at your problem from 3 angles . . .

First, what alloy steel or alternate grade will be best for your product . . . *second,* how to process the alloy selected on your present equipment . . . *third,* how to make the product best at lowest cost.

See what we mean by 3 x 3 = 1, when Republic 3-Dimension Metallurgical Service supplies the answer? A call to your Republic Sales Office will bring a Republic Field Metallurgist to hear your question.

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HELP

ON PROBLEMS INVOLVING

FOR PRODUCERS

AND REFINERS

EMULSIFICATION

WASTE OIL DISPOSAL

SALT FOULING

CORROSION

SCALE

PARAFFIN

Having specialized in the production of petroleum emulsion-breaking chemicals longer than any other organization, the Tretolite Company offers a wealth of service know-how and a background of research effort which insures a quick and economical solution for your emulsion problems.

The disposal of waste-oil and oil-bearing waste waters can result in serious stream pollution problems. Tretolite offers advisory service and an effective line of oil-in-water demulsifiers.

The efficient extraction of harmful salts from refinery charging stocks by the use of chemical demulsifiers has been carried on by Tretolite for many years. Ask about the complete Tretolite desalting service.

Every year, both in the field and in the refinery, corrosion takes a costly toll in metal equipment destroyed. KONTOL, the Tretolite Company corrosion inhibitor, is applicable both in the field and in the refinery, and can already cite many effective case histories of protection.

Effective prevention can stop many costly scale accumulations before they cause operational difficulties. The Tretolite S.P. chemicals prevent adherence of scale-forming inorganic solids on the working surfaces of pumps, pumping equipment, valves, flow lines and traps.

In many instances, an effective paraffin solvent can prevent the accumulation of line-plugging paraffins and asphaltines. Tretolite Company paraffin removing chemicals have both solvent and detergent properties, and often deliver excellent results at minimum cost. Ask your Tretolite field engineer about SOLVO or PARASOL.

DEHYDRATING · DESALTING · CORROSION INHIBITING · SCALE PREVENTING PARAFFIN REMOVING

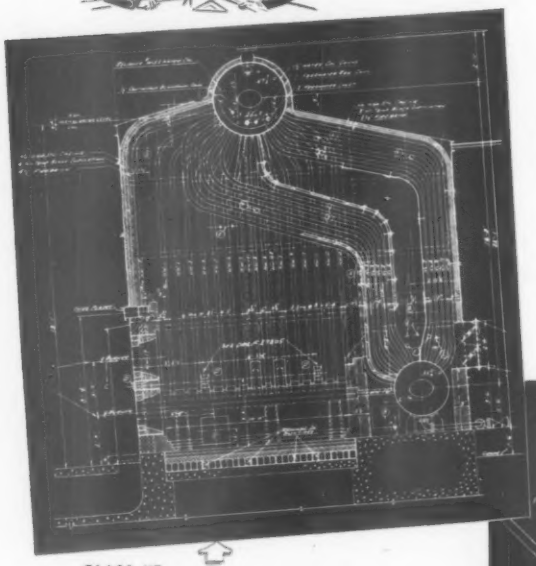
TRETOLITE COMPANY

SAINT LOUIS 17, MISSOURI

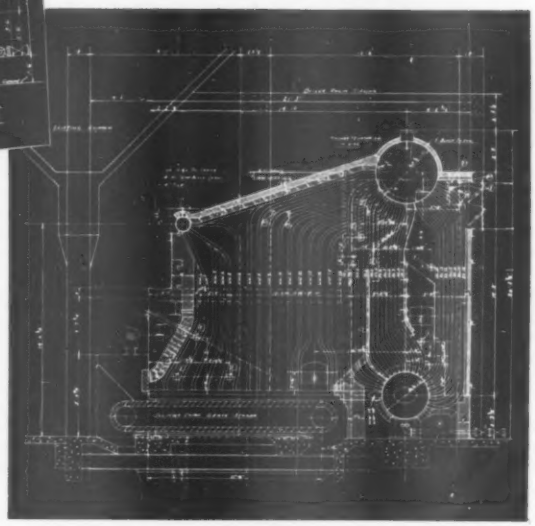
LOS ANGELES 22, CALIFORNIA

Industry Approved

Two-Drum
STEAM GENERATORS
by Vogt



CLASS VF
A 22,000 pounds steam per hour unit installed at Indiana Farm Bureau Refinery, Mt. Vernon, Ind.



CLASS VS
The Seelbach Hotel, Louisville, Ky. is served by this 50,000 pounds steam per hour boiler.

A wide variety of industrial plants and other users of steam for power, processing, or heating have found these efficient Vogt Two-Drum Type Boilers to be the answer to their diverse steam generating requirements.

Class VF units provide maximum capacity in limited floor space and head room, while Class VS is best adapted to installations not having such restrictions. Each has a large furnace volume and a high ratio of radiant heating surface. The furnace design assures proper combustion of fuels fired in suspension or with various type of stokers.

A bulletin with general information and showing typical installations is available on request.

Typical Users...

FOOD PROCESSING PLANTS

DISTILLERIES • HOTELS

HOSPITALS • CHEMICAL PLANTS

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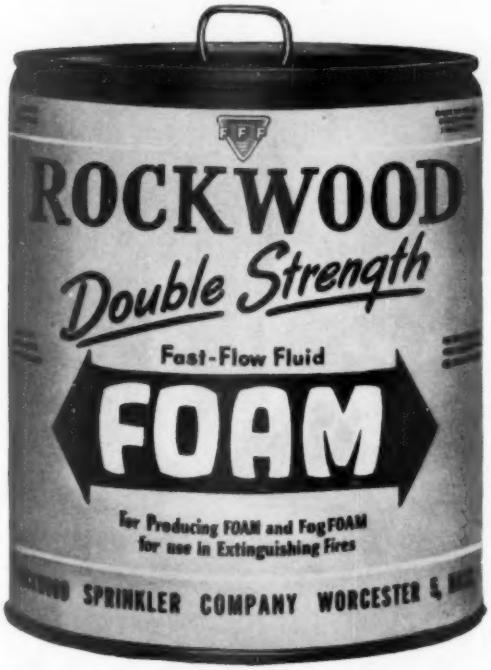
Quenches Quicker!

. . . with Less Water

that's the Short-Short Story of Rockwood Fire Fighting Aids

That's why fire-fighters like to work with Rockwood's equipment. Take for instance our new contribution to modern fire fighting, the Rockwood Double Strength FOAM Liquid which has many important advantages. Three of these are:

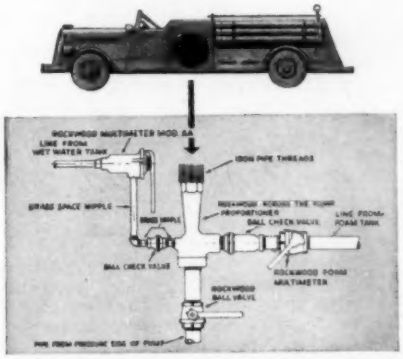
- 1. more fluid
- 2. faster spreading
- 3. flows freely at sub-zero temperatures



Rockwood's new Double Strength FOAM Liquid will put out fires in flammable liquids faster and at lower cost. Three parts of FOAM liquid mixed with 97 parts of water form an excellent foam blanket that will quickly re-seal if broken. Double Strength FOAM Liquid is more fluid, faster spreading and flows freely at sub-zero temperatures (−15° F.) It is quicker to put into action, covers burning surfaces faster, seals off combustible vapors completely and flows freely around obstructions. This foam blanket has proved its ability to extinguish large spill fires in gasoline with maximum speed and safety to firemen.

ROCKWOOD SPRINKLER COMPANY

Engineers Water . . . to Cut Fire Losses



Accurate Mixing Assured: Automatically feeding Double Strength Foam or Wet Liquid into hose lines, Rockwood's Model Dual "B" Around-the-Pump Proportioner is designed for use where pressure is maintained by a pump from either draft supply or booster tank. Multimeter settings admit proper amounts of wetting agent for varying nozzle discharges and solution strengths.

Special Fire Truck Proportioning Systems for FOAM Liquid and Wetting Agents

Trucks for crash-rescue fire fighting, at airports or for handling spill fires in an oil refinery require special proportioning systems for large volume FOAM discharge through several FOAM turret and hand line nozzles.

Custom engineered proportioning systems to meet these and other unusual requirements are a Rockwood specialty. If you have such hazards let us engineer a proportioning system to fill your needs.

SEND FOR THIS ILLUSTRATED CATALOG

ROCKWOOD SPRINKLER COMPANY
104 HARLOW STREET, WORCESTER 5, MASS.

Please send me Rockwood's illustrated catalog on the complete line of cost cutting, efficiency-boosting products for modern fire fighting.

Name_____

Title_____

Company_____

Street_____

City_____

Zone_____ State_____

Funny Thing—
he really had something!

"The miracle of the century!" he would rant. "The most sensational discovery of all time! Positively guaranteed to restore natural color to the hair, free you from the crippling clutches of rheumatism, break the most stubborn fever, cure coughs, colds, backache and liver complaints!

"Now to you, my friends, as a special introductory offer, this bottle, which usually sells for $15 and more is yours . . . not for $10, not for $5, but for the amazing low price of . . ."

Pure hokum, of course. For little did the medicine man realize, when he bottled crude oil out of the ground, that his most extravagant claims could not do justice to the real capabilities of this "liquid gold." He really had something—and didn't know it.

His "Rock Oil Nostrum" really *was* the miracle of the century!

From his giant economy-sized bottle have since flowed the oil and gasolene that made the automobile possible . . . the lubes and greases that have enabled machines to take over man's back-breaking jobs. From that miraculous bottle have come asphalt, insecticides, wax, plastics, literally hundreds of useful products—even drugs "to cure coughs, colds, backache and liver complaints!"

Cities Service, an oldster in the oil business, has been responsible for many of these petroleum miracles. It is pouring more products out of that bottomless bottle every day. The men in its Miracle Department (petro-chemists, they're called), say that oil has just been flexing its muscles—we haven't even begun to see all it can do.

To put it very simply: You and I live better, more comfortably, because petroleum was discovered. And that's no hokum!

CITIES SERVICE

Quality Petroleum Products

ELLIOTT DIESEL-DRIVEN GENERATORS

are serving all over the map!

Literally thousands of Elliott generators are quietly reeling off the kilowatts, serving in every state of the Union. Types include direct-current, alternating current, horizontal and vertical generators. Elliott "Fabri-Steel" construction used in all present-day Elliott generators, not only provides exceptional rigidity and crack-proof strength, but also facilitates custom-built design to the precise requirements of the individual installation.

Elliott FABRI-STEEL MOTORS AND GENERATORS

ELLIOTT Company

Ridgway Division
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Plants at: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
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R2-5

Oil powers its progress . . . your bank helps you produce it!

Oil lies buried under one . . . two . . . three miles of dirt and rock. Finding it — recovering it — is a job for men of courage and skill — oilmen — with the will to work and the right to profit.

It is also a job for money. Lots of it. And hundreds of millions of dollars of it have come from our bank. It is supplied by our depositors — and by our stockholders who provide our capital and surplus of $42,500,000, giving us the highest lending limit of any bank in the South.

Years ago the Republic pioneered the first oil production loans by commercial banks. Since then our bank has made so many oil loans — in every oil-producing state in the nation — that oil men call us "The Oil Bank."

We like that name. It tells the story of Republic's leadership in working for this dynamic industry. It tells, too, of the many ways our bank works for *you* — for every oilman!

Oil is America's fortune. It means better living — bigger business for every American. We're glad your bank has a hand in it.

Fred B. Mooney
PRESIDENT

REPUBLIC NATIONAL BANK OF DALLAS

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Capital and Surplus $42,500,000 — Largest in the South

SPEED — SAFETY — ECONOMY

with CHIKSAN's new

Portable Rig Rotary Hose

Oil Men Asked for it..
Chiksan Engineered it!

The 1st Rotary Hose Designed Specifically For Portable Rigs!

CHECK THESE FEATURES

- Designed and engineered specifically for Portable Rigs
- Provides complete flexibility and ease of operation in limited space
- Provides uniform strength and safety
- Eliminates possibility of loss of circulation or complete failure
- Accommodates higher pump pressures
- Engineered for practical maintenance
- Strengthens both drilling swivel and standpipe goosenecks
- Eliminates rubbing of hose against mast leg
- Eliminates kinking or twisting of hose
- Keeps derrick floor clear of hose
- Can withstand extreme climatic conditions
- Easily, swiftly, and safely transported
- Savings in initial cost and cost per foot of hole drilled
- Successfully field tested

The complete assembly tested to 6000 psi consists of a hose-saver outrigger arm, an all-steel rotary hose, and a drilling swivel extension. For complete information on this new advance in rotary drilling, contact your Chiksan or Weco representative, or write for further information.

Write Chiksan today for special brochure with detailed engineering drawings.

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The Flow of Enterprise Relies on **CHIKSAN**

Ball-Bearing Swivel Joints

Representatives in Principal Cities
Sold by Leading Supply Stores Everywhere

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey
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IN THE PETROLEUM INDUSTRY

There's more to CORROSION than meets the eye

Sometimes VISIBLE...Often HIDDEN...Corrosion Strikes Everywhere

This year, the Petroleum Industry will pay millions of dollars for needless losses created by corrosion... *yet much of this corrosion may never be discovered* until it's too late to protect—and time to pay!

Corrosion is readily detected when it appears as rust layers or failing paint on exposed surfaces. But, by far, the major costs of corrosion come from hidden areas—where only minute inspections and constant care can prevent costly failures.

YOU LOSE IN A "WAITING GAME"

Don't wait for rust or other visible signs to appear. Visible or hidden, corrosion will destroy costly equipment... halt production... cause unnecessary maintenance shutdowns... and contaminate valuable products. Thus, corrosion dips deep into your profits as it creates needless losses totaling thousands of dollars.

YOU CAN PREVENT NEEDLESS WASTE

Check your tanks, piping and equipment for corrosion's presence. Double-check areas that are vulnerable to *hidden corrosion*. If you would like help, an AMERCOAT Field Engineer will gladly assist you in making a thorough analysis. There is no obligation.

What is AMERCOAT?

AMERCOAT is a method of corrosion control. Not just a single product, but a complete LINE of coatings, individually formulated to solve or control specific industrial corrosion problems.

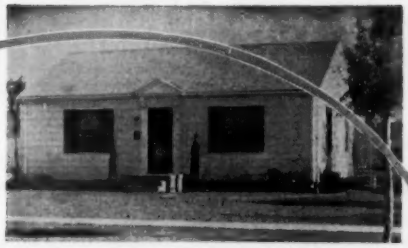
FOLLOW THE LINE OF [illegible] RESISTANCE... PROTECT WITH AMERCOAT

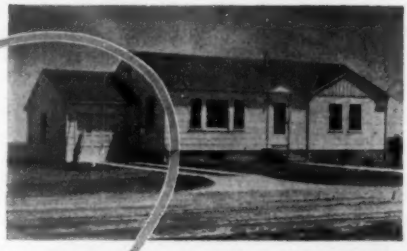
AMERCOAT CORPORATION

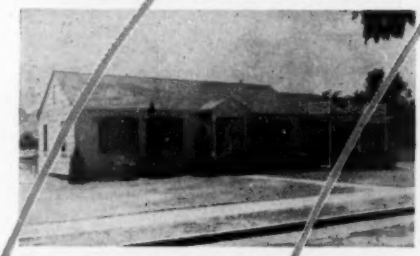
4809 FIRESTONE BLVD., SOUTH GATE, CALIFORNIA

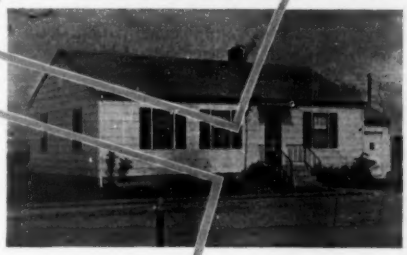
CHICAGO, ILL. NEWARK, N. J. JACKSONVILLE, FLA. DALLAS, TEX.

WHICH HOUSE IS NOT PREFABRICATED?









This is a fooler. ALL the houses here are prefabricated. In fact they are all standard STURDYBILT designs now in use in oil fields in many parts of the country.

Users of STURDYBILT Prefabricated, Demountable Houses know they get *all* the features of conventional houses, plus many other advantages.

STURDYBILT Houses are attractive, comfortable and weather tight. At the same time, they can be easily transported and erected anywhere a truck can go. They can also be "knocked down" and moved to a new location with practically no loss of material.

Specify STURDYBILT Prefabricated Houses for all your field housing needs.

MANUFACTURERS OF SPECIAL WOODWORK; DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

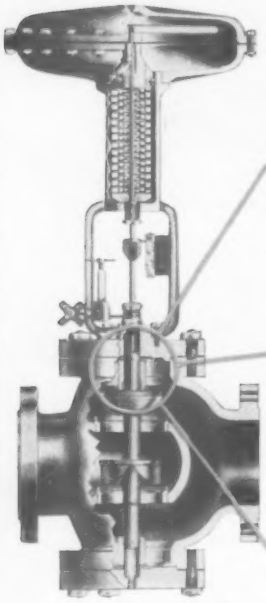
Have a preference... a special application?

There's A Standard Teflon Stuffing Box

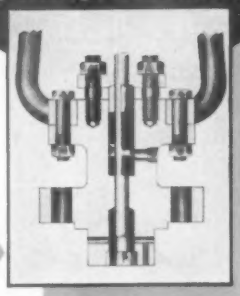
The use of Teflon in Climax Controls stuffing boxes is standard procedure with BS&B. There's a Climax Teflon stuffing box to meet any preference. Here, we show three of them as applied to Climax Diaphragm Control Valve Type 86. BS&B stresses correct stuffing box design because design has such a great effect on hysteresis. Any friction in the valve may result in improper operation and unsatisfactory service. To further overcome the threat of friction, the lower stems in all Climax Controls of this type are super polished.

Teflon resists almost all known corrosive fluids. It's self lubricating and means less friction. Spring loaded Teflon reduces maintenance which might normally result from packing nut being applied too tightly.

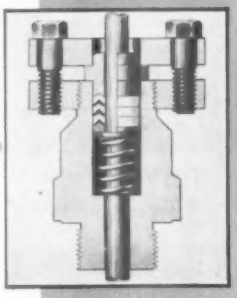
for the BS&B Climax Controls needed in your processing



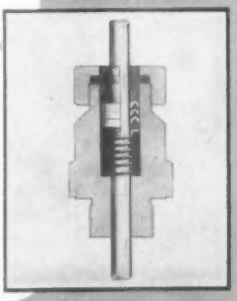
Teflon or Standard bolt stuffing box. *The top works or yoke of the valve is removable without disturbing the stuffing box. This stuffing box is applicable to Climax Controls, Types 86, 73, 1286, 87, 15, 115 and 1486.*



Bolt-down type, spring loaded Teflon *using CVU Ring. Available for, or present standard stuffing box can be converted to, the following Climax Controls, Types 86, 73, 1286, 87, 15, 115, 1486, 125, 120, 128, and 58.*



Standard Packing Nut stuffing box. *Screwed down packing nut design assures minimum frictional lag and a minimum of maintenance. Features the dependable CVU Teflon Ring. Can easily convert old style valves using standard stuffing box to Teflon packed.*



The type of stuffing box you require depends on . . . (1) The fluid being handled (2) Individual maintenance problems. The interchangeability of Climax Controls stuffing boxes is highly important to both old and new users. Teflon stuffing boxes are actually standard with Climax and can be included when controls are ordered . . . or conventional type stuffing boxes can be interchanged with Teflon stuffing boxes in the field with a minimum of time and effort. Tell us what fluids you're handling and what your problems are . . . then let us make a recommendation — Write . . .

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BLACK, SIVALLS & BRYSON, INC.

CLIMAX CONTROLS DIVISION, DEPT. 4-A1

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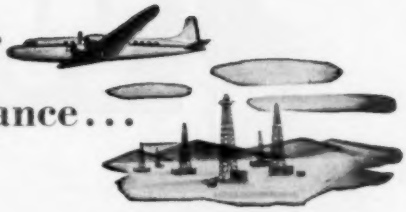
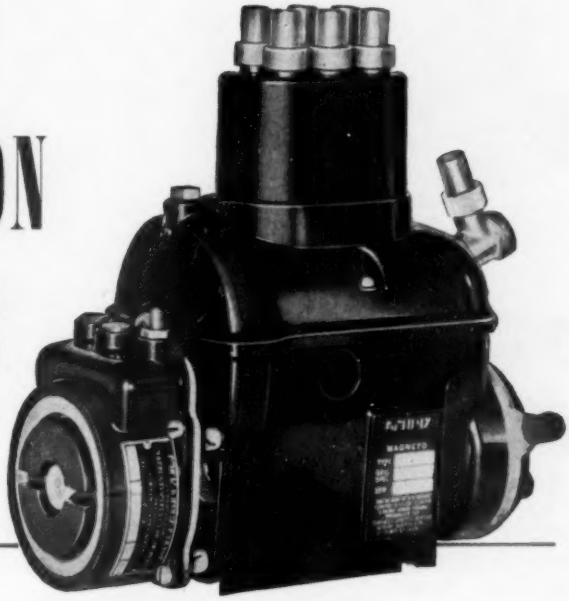


and Down-to-Earth Performance . . .

BENDIX LOW-TENSION MAGNETOS



CONTROL EXPLOSIVE FUMES with FLAME-PROOF VENTILATION!

The Scintilla Magneto Division of the Bendix Aviation Corporation, foremost producer of low tension ignition systems for the aviation industry, now manufactures this same system to fully meet an important safety requirement of the petroleum industry's engine operations. For example, a special ventilating arrangement permits even air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

With the Bendix Low-Tension Magneto, spark plug erosion is reduced to a minimum and variable or fixed ignition can be obtained by internal adjustment. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with a conventional distributor.

For safety and low operating costs be sure to specify Bendix Low Tension for your magneto requirements. Complete data available on request.

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- Breaker Type Distributor
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- Radio Shielding Available
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HP-8000 7¼" x 12" delivers 577 GPM at 555 PSI with 7¼" liners to 322 GPM at 995 PSI with 5½" liners at 70 RPM.

220 INPUT HORSEPOWER

MORE PRESSURE—MORE MUD

Duplex Slush Pumps

STEEL OR ALLOY IRON FLUID END OPTIONAL

HP-14000 7½" x 14" delivers 613 GPM at 838 PSI with 7½" liners to 316 GPM at 1627 PSI with 5½" liners at 60 RPM.

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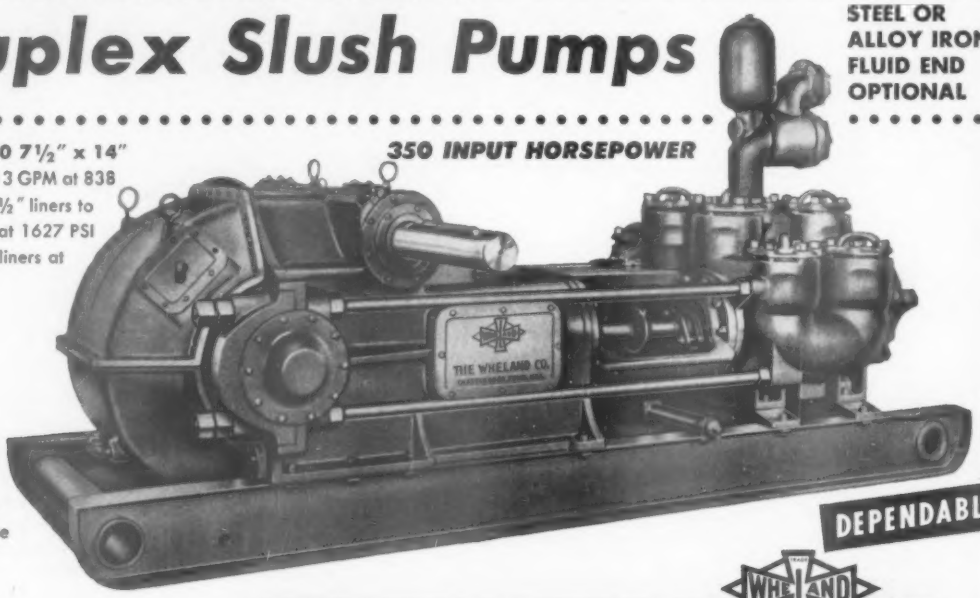

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ROTARY DRILLING MACHINERY

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
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EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York — Broad Street House, London E. C. 2, England

A better coating job because the Enamel is backed by rigid *Specifications!*

PITT CHEM Modified Enamel will give you a better coating job every time because every drum meets the same rigid specifications as the last. These specifications are available on request—written proof that Pitt Chem Modified Enamel will perform better on application and in use.

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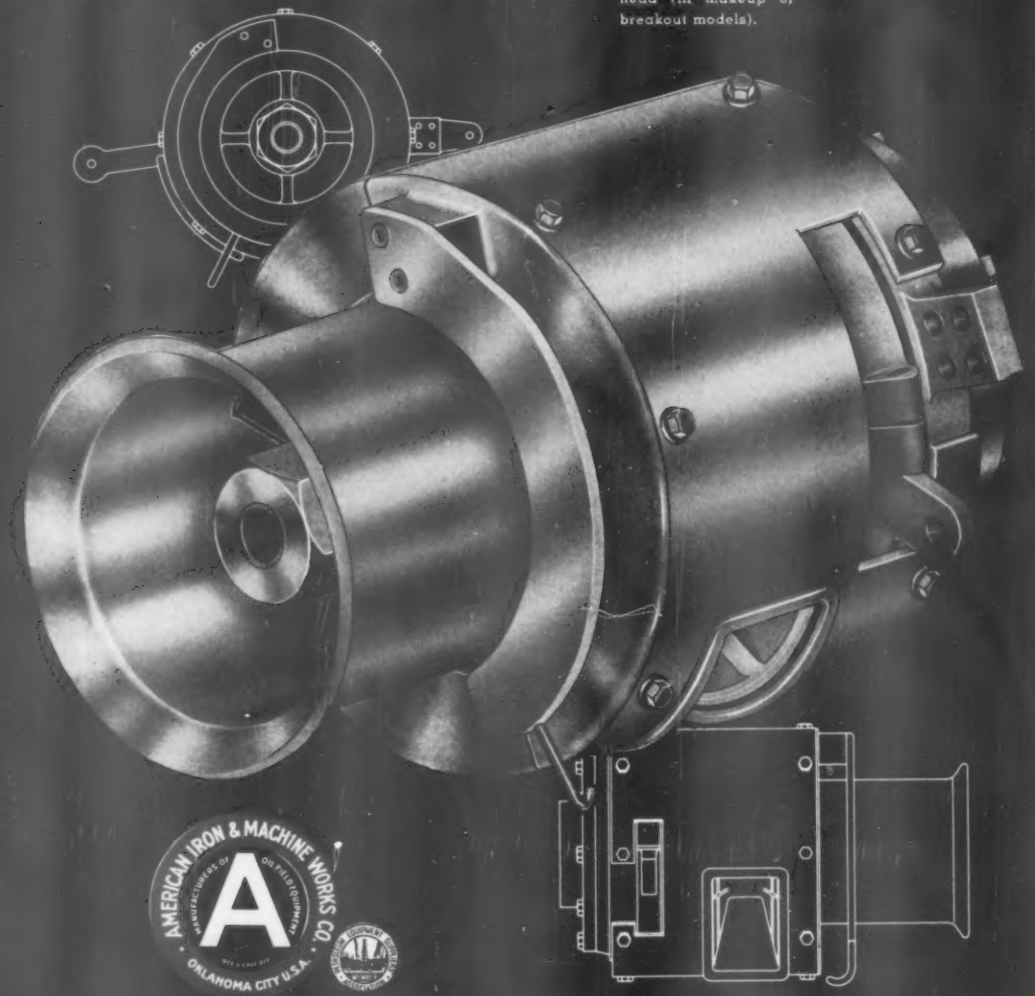
UNIVERSAL FRICTION CATHEADS

For use on ANY SIZE drawworks . . . "Universal" is small in size but BIG in performance. Easily installed on small drawworks but also equally desirable for the largest drawworks because there is power enough to break any connection. With "Universal" the line pull is closer to the shaft bearing . . . there is instantaneous engagement and release . . . there are no sensitive toggles to get out of adjustment! For outstanding results on any drawworks, always specify this American Iron Universal Friction Cathead (in makeup or breakout models).



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They Say—

Something Will Happen . . . Soon

"Looking back with the customary wisdom of handsight one can fasten on two fundamental errors in this long (Iranian) dispute.

"On the British side there was a slowness to realize the strength of Iranian nationalistic feelings and the need to make drastic and generous financial concessions. When, starting in 1949, the British offered these concessions it proved too late.

"On the Iranian side there was the colossal error of believing that Britain and the West had to have Iranian crude oil and the use of the Abadan refinery. In fact, the loss of production was quickly made up from other sources and new refineries are taking the place of Abadan. Hence Iranian oil is not needed and to take it now would mean a cut-back in other production fields and a costly and elaborate shifting of tankers from their present routes.

"Meanwhile the legal situation is locked in a vise. The British demand some compensation and some role in the marketing of the oil; the Iranians agree to compensation in theory, but on their own terms, and they have not yet agreed to allow the Anglo-Iranian Oil Co. to have any part in their oil trade.

"Politically the situation has deteriorated greatly. Premier Mossadegh is the prisoner of the intense nationalism he helped to create. His country is bankrupt, and the Russians are not only on his doorstep; they have a Trojan horse inside in the form of the Communist Tudeh party. Diplomatic relations have been broken with the British and the only remaining link of any account with the West is the United States Embassy.

"Such is the precarious situation today as talks continue in London and Teheran. Obviously, something has to happen—and soon."

Editorial in the New York Times.

Growth in Canada

"In 1946 Canada had but a year's supply of crude oil at her disposal. Today we have an adequate supply for 10 years, barring a major war. This is even more impressive when it is remembered that Canada's oil requirements have also increased 85 per cent since 1946.

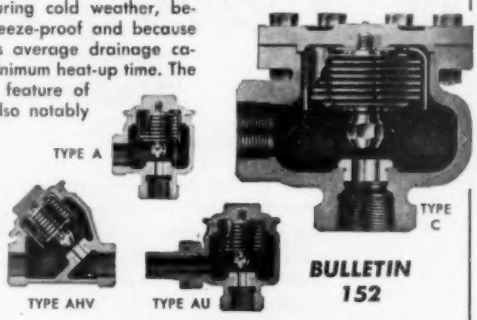
"To date, the problem has been the lack of facilities to transport available crude to markets. Once these lines are completed, the problem will be to produce sufficient oil to meet the en-

NICHOLSON MAKES

FREEZE-PROOF Steam Traps

for every Plant use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates heat transfer in severe weather. Types for every plant use. Size ¼" to 2"; pressures to 250 lbs.



BULLETIN 152

210 OREGON ST., WILKES-BARRE, PA.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

TEAM WORK MAKES THIS A WINNING ELEVEN

We consistently field an unbeatable eleven to tackle the essential operations in drum manufacture. If you feel that the time has now come for you to produce your own drums, we should be pleased to advise you and supply the most economical plant for your job. In short, if you wish to play at home, we can arrange a fixture on your own ground.

MOON

Regd. Trade Mark

MOON BROTHERS LIMITED, BEAUFORT ROAD, BIRKENHEAD, ENGLAND

Cables: "Moonbro" Birkenhead, England

AGENTS IN U.S.A.: M. Neumunz & Son Incorporated, 90 West Street, New York 6, New York

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MAKERS OF TIN BOX AND DRUM MAKING MACHINERY

dm MB 46

THEY SAVED UP TO 50% ON INITIAL INVESTMENT WITH

Carter Variable-cycle

long-stroke Hydraulic Pumping Units

Designed-Built-Priced FOR STRIPPER WELLS

Look at the impressive savings (shown below) in initial investment alone — savings up to 50%. In addition, there are many, many cases on record showing substantial increases in production — less sanding up — elimination of gas lock — less sucker rod failures. How are these advantages achieved? Simply by the LONG, SLOW STROKE AND APPLICATION OF THE CARTER VARIABLE-CYCLE METHOD. Over 500 units in operation now. On the approved list of many major companies. Let us back our claims with proof on your well!

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IN CANADA
Engineering Specialties Company
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IN VENEZUELA & COLOMBIA
Mr. William S. Waldrip, WALCO, S. A.
Caracas, Maracaibo, Puerto La Cruz

larged markets they have made available."

Ole Berg, Jr., president, British American Oil Co., Ltd., addressing the Petroleum Club of the Cleveland Chamber of Commerce.

Imports and the Texas Independent

"Take the average independent. He points out that Texas is not authorizing the full allowable under its interstate oil pact quota. He has the oil. He wants to produce and sell it. The bar to that, he points out, is that the major companies, his normal market, are not buying because they use their own imports. Under our sound enough conservation theories, the Texas Railroad Commission, our regulating body, does not permit more production than can be absorbed by market demand.

"Now consider the major companies who are responsible for importing their own oil produced abroad. They point out that at practically every point where they hold concessions, they must produce or run a risk of losing their holdings

"This is because outside of this country mineral rights almost invariably are government owned, oil concessions derived from government. These governments are only interested in production because their incomes come from it. An American company failing to produce and sell might easily find its concession withdrawn. Again, wherever a company operates abroad it has always at its back the possibility of expropriation and confiscation. So, if it has oil, it feels an earnest compulsion to market it.

"So here is a conflict between two economic interests. The independents are being deprived of markets. The majors regard a possible import restriction as an invitation to loss of investment. Whichever side has its way, the other stands to lose."

Editorial in the Dallas Morning News.

On the Change in Administration

"It is now the time for us to show our statesmanship. We must not change from the hunted animal to the devouring beast—but rather we must emerge from behind the trees confident that we will not be fired upon by the first government agency that spots us.

"We must quietly, sincerely and energetically carry on our duties like the true domesticated animal—the beast of burden if you like, but the servant of our country."

Donald F. Carpenter, E. I. du Pont de Nemours & Co., addressing the manufacturers' section, Delaware Chamber of Commerce, Wilmington, Del.

. . . who's got the button?

you have!

Our customers also deserve an Otis service pin. As we approach our silver anniversary year we gratefully acknowledge *your* share in our progress . . . in making Otis the only organization in the Industry with a full complement of "pressure control" facilities — from manufacturing and marketing to field service crews which offer a large variety of services conducted "under pressure." Thank you for your part — for being our customers.

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Otis Pressure Control, Inc.

Established in 1928 by H. C. Otis as The Southern States Company

You can't beat *CARBIDE*

as your supplier of these chemicals!

So *many* plants dehydrate or desulfurize natural gas by these methods. Why?—Because you can't beat the initial low cost of the glycol or amine plants—nor their economy and simplicity of operation. If you are constructing a new plant or are replacing, modernizing, or enlarging your present facilities, be sure to consider these glycols and amines!

During 20 years as a supplier to the natural gas industry, we have gathered much experience with these amines and glycols. For information about their properties or use, just call or write your nearest CARBIDE representative. CARBIDE maintains warehouse stocks of these gas-treating chemicals near most of the major gas fields to assure you prompt delivery.

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CALENDAR

JAN.

19-21 Pipe Line Contractors Association, fifth annual convention and exhibit, Shamrock Hotel, Houston.

19-22 American Society of Mechanical Engineers, and Society for Advancement, Plant Maintenance Conference, Public Auditorium, Cleveland.

19-23 American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.

21-23 Southwestern Legal Foundation, fourth annual Institute on the Law of Oil and Gas and Taxation, Dallas.

27-28 Kansas Oil Men's Association, annual convention, Hotel Lassen, Wichita.

28-30 Symposium on Instrumentation for the Process Industries, Agricultural and Mechanical College of Texas, College Station.

FEB.

2- 6 Corrosion short course, sponsored by National Association of Corrosion Engineers, University of California, Berkeley.

5- 7 Missouri Petroleum Association convention, President Hotel, St. Louis.

16-21 American Institute of Mining and Metallurgical Engineers, annual joint meeting of petroleum, metals, and mining branches, Statler Hotel, Los Angeles.

18 Instrument Society of America, sixth annual New York regional meeting, Hotel Statler, New York.

18-19 Pacific Coast Gas Association, technical services conference of technical section, Hollywood, Calif.

27 Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

MAR.

2- 6 American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

15-20 American Chemical Society, petroleum division, spring meeting, Statler Hotel, Los Angeles.

16-20 National Association of Corrosion Engineers, ninth annual conference and exhibition, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting Mayo Hotel, Tulsa.

23-25 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

23-26 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Sam Houston Coliseum, Houston.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

30-Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APR.

7- 9 Petroleum Industry Electrical Association, annual convention and exhibit, Shamrock Hotel, Houston.

8-10 American Petroleum Institute, division of production, Eastern district

an
ACCO
product
No. 409-P
R-P&C
Full Plug
Bronze
Globe Valve
1
P&C
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• High test bronze body and bonnet; nickel-alloy disc and seat ring; high tensile, high torque rolled bronze stem—plus large, deep stuffing box easily repacked under pressure—these are the features which make R-P&C Bronze semi-plug and full-plug Globe and Angle Valves outwear ordinary valves. They're fine for frequent or continuous throttling of steam, gas, oil, water. This type valve can be furnished in 200, 300 and 350 lb. pressures.
See your R-P&C distributor for information on the complete line of R-P&C valves or write nearest district office.
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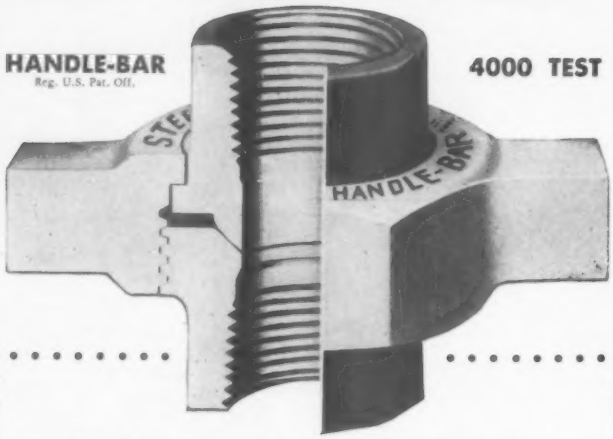
R-P&C valves

this will SURPRISE you

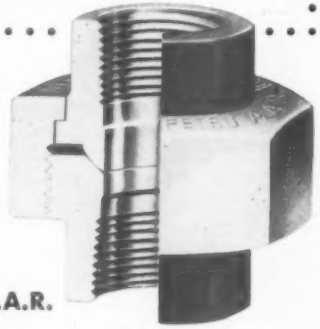
HANDLE-BAR
Reg. U.S. Pat. Off.

4000 TEST



Low test pressure does not mean low price in quick type unions. HANDLE-BAR 4000 Test forged steel unions are priced lower than any 1000 or 2000 Test quick type union. The reason: HANDLE-BAR unions are volume produced from forgings to finished union in our own plant. Check these prices and compare the unions. **2"—$4.77; 2½"—$8.89; 3"—$11.43** and **4"—$16.84.** Sizes ⅜" through 4". Specify HANDLE-BAR and save the difference.

PETRO A.A.R. is hot-forged of A.I.S.I. 1023 open hearth, silicon killed forging steel. It meets all chemical specifications for forged steel pipe fittings. Both seats are machined and the female seat is cold rolled. Nut threads are permanently lubricated with Udylite Cadmium. Specify PETRO A.A.R. for economy and perfect satisfaction.



PETRO A.A.R.
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For additional information about these and other Forged Steel Unions write Department O, for Illustrated Catalog or refer to listings in Composite Catalog pages 3194-3195, Refinery Catalog page 695 and Chemical Engineering Catalog pages 1294-1295.

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meeting, William Penn Hotel, Pittsburgh.

15-17 National Petroleum Association, midyear meeting, Cleveland.

21 Association of Consulting Chemists and Chemical Engineers, Inc., Hotel Belmont Plaza, New York City, symposium and dinner.

21-23 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

24-25 Interstate Oil Compact Commission, 1953 spring meeting, Roosevelt Hotel, New Orleans.

26-29 American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.

27-28 Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

Apr. 29-
May 1 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

Apr. 30-
May 1 American Gas Association, transmission and storage conference, Edgewater Beach Hotel, Chicago.

MAY

4- 5 American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

7- 8 American Petroleum Institute, Rocky Mountain district, Division of Production, spring meeting, Gladstone Hotel, Casper.

11-13 Southern Gas Association, Jung Hotel, Hotel, New Orleans.

11-14 American Petroleum Institute, Division of Refining, midyear meeting, New York.

13-14 Pacific Coast Gas Association, annual gas supply and transmission conference, Santa Barbara, Calif.

14-23 International Petroleum Exposition, Tulsa.

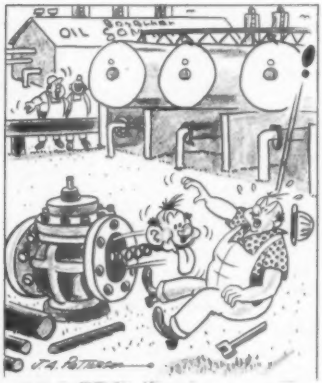
15-16 International Gas Union, council meeting, Paris, France.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

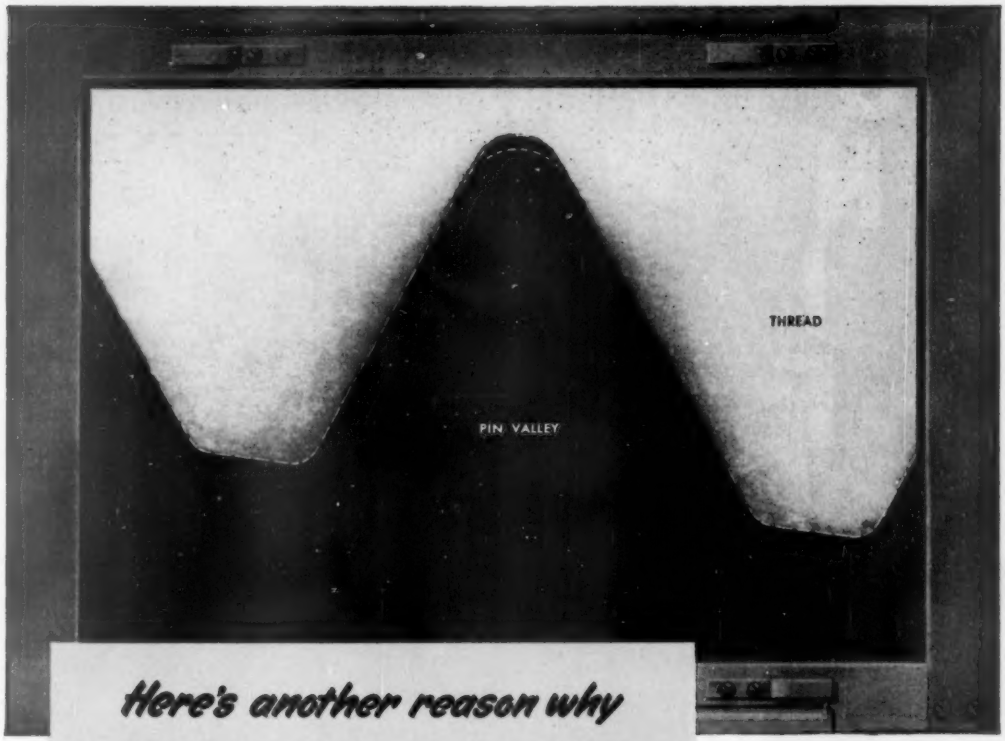
28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

JUNE

2- 3 American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.

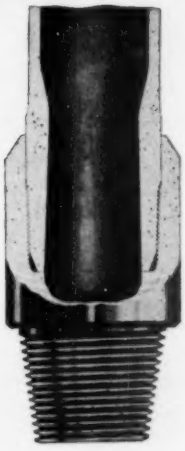


"See! And when the new man touches it—out it pops!"



Here's another reason why

REED TOOL JOINTS *last longer*



This photograph of the screen of a thread comparator shows the enlarged profile of a **REED** Tool Joint thread. To an experienced inspector this picture indicates a virtually perfect thread form.

This comparator is just one of many **REED** inspection tools that help make sure the threads on the tool joints you get are absolutely accurate.

Thread accuracy is another important reason why **REED** TOOL JOINTS LAST LONGER!

REED ROLLER BIT COMPANY

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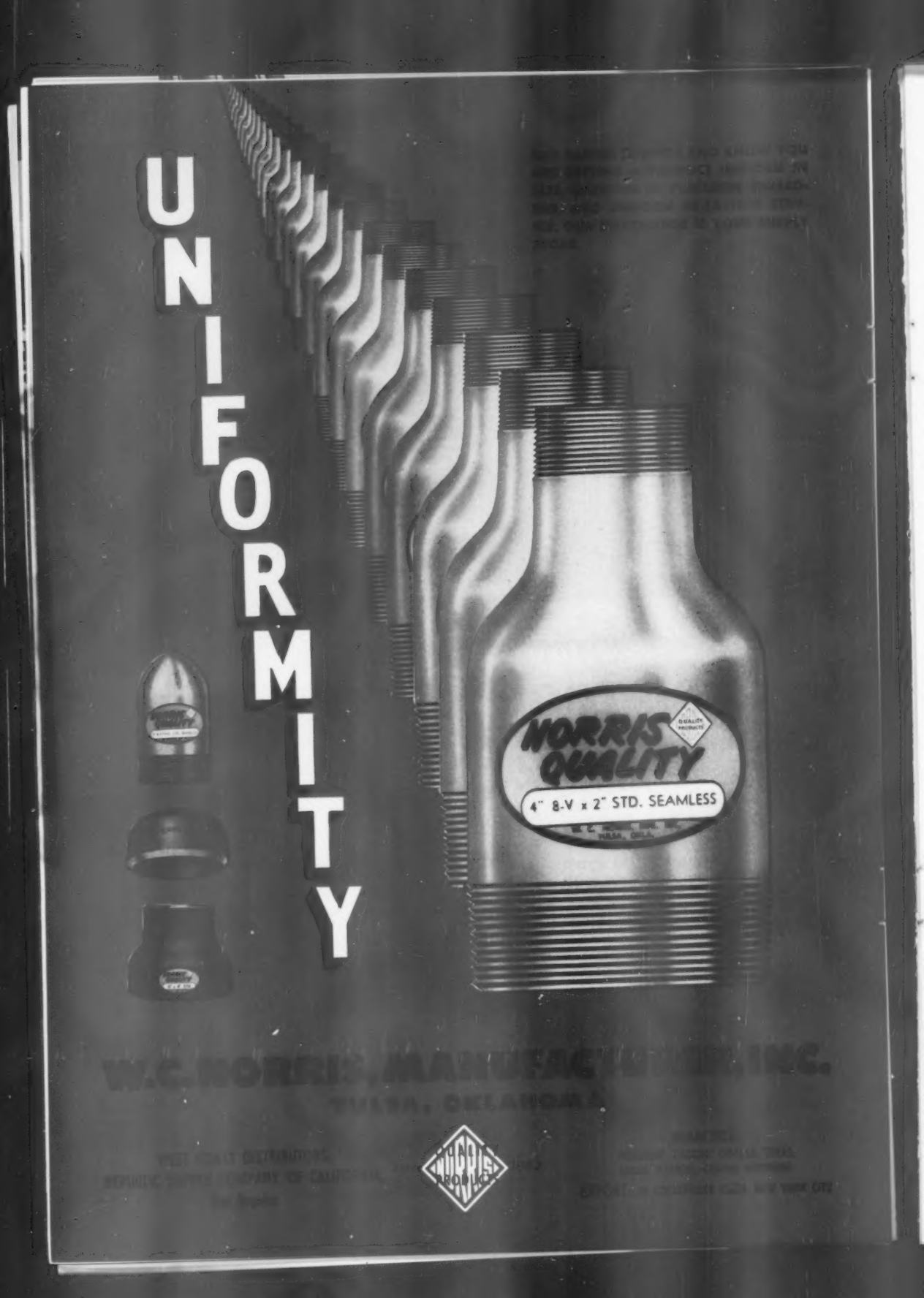
NEW YORK LONDON BUENOS AIRES

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products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JOURNALLY Speaking

30 Years' Watch

EDITOR-IN-CHIEF C. O. Willson is sporting a fine new wrist watch these days, and so is Bob Porch, one of our compositors, and Joe Courtney, one of our pressmen.

The reason is that all three of them completed 30 years of continuous service with the Journal. Their 20-year pins are now getting rather common around our shop, but now they are in a much more exclusive club. Service of such length or longer may not be unusual in oil companies but it is on a publication. Time was when printers and journalists were traditionally on the go, moving from shop to shop every few years. But these three, each plying his own trade, wandered in in 1922, liked it, and stayed.

We like it, too. Such tenure gives continuity to the Big Yellow Book. It shows that we are rooted with the oil industry's early days while still keeping pace with its progress. And the fact that all three are in different departments shows that we are just one big happy family and that editors and printers can get along with each other even though each may blame the other for typographical errors.

Oil on Display

FOR a good many years we have heard people remark that there ought to be an oil museum someplace where laymen and novices (and even people pretty well in the oil business) could study models and exhibits showing how oil is found and produced, how the equipment operates, how the industry started and grew, and many other things about this fascinating oil business.

A lot of people talked about it, as we said, but now somebody is doing something about it. Who? Who else but the energetic and indomitable Desk and Derrick girls. The girls of the Tulsa chapter not only think there ought to be such a museum, but they think it ought to be in their home town and that they are just the people to get it established.

They kicked the idea around among themselves for a while until they were sure it was sound, and then they asked for help. They have created a committee of industry and civic leaders to canvass the possibilities, and they have engendered a surprising amount of cooperation and enthusiasm. So far the museum is still just a gleam in the eye, but things are cooking which make it look as though it may get an actual start in a big way before too long.

Index Out

IF you're the kind of person who wants to look back and see what happened some time in the past, you need a copy of the Journal's annual index. The Big Yellow Book printed more than 4,500 pages of editorial material (darn good, too) in 1952. You can't tell the players without a program, and you can't find a back article without an index.

The 1952 Index is now ready for distribution. It took 48 pages to list the headings of the articles published during the 52 weekly issues. The pamphlet is the same page size as the weekly Journal, so it will fit neatly on the shelf with the books themselves. You can have one absolutely free, but there's just one catch to it: You have to send a request to our Circulation Department.

Key Work

A LOT of men have been punching keys in our shop the last few weeks, typewriter keys, linotype keys, and particularly tabulator keys. The whole staff is right in the big middle of putting together our Annual Review and Forecast number. You'll see the results next week.

This big issue the last week in January every year always contains the key figures on all phases of the oil and gas industry. And the forecasts give the key to the industry's activities during the coming year. Our staff started getting keyed up for this job before Christmas and at this moment they're at a high pitch but right on key.

Henry D. Ralph.

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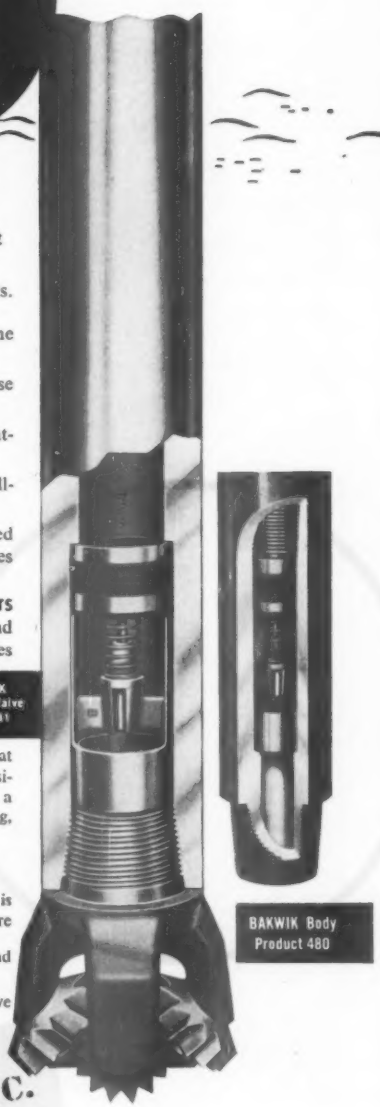

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HOUSTON • LOS ANGELES • NEW YORK

We have to fight for the right to compete

A NEW era of competition is generally predicted for American industry now that the postwar world-wide shortages of materials and goods are being overcome.

Of vital importance to the oil industry is whether this will be "hard" competition or "soft" competition. Hard competition means full and free competition, with the minimum of rules required by decency and fair play. Soft competition means regulating business so that nobody, including the inefficient, gets hurt.

The depression and the New Deal fathered a philosophy of soft competition. Various statutes and particularly the policies of the Federal Trade Commission aim to put a crutch under weak operators by limiting the extent and methods of competition and softening the blows of normal methods of getting business.

SOFT competition is like an athletic contest which must end in a tie because it is "unfair" if some competitor loses. In practice, the rules of soft competition are almost always applied against big companies in the guise of protecting small business. The result is that prices get raised to the level of the least efficient operator.

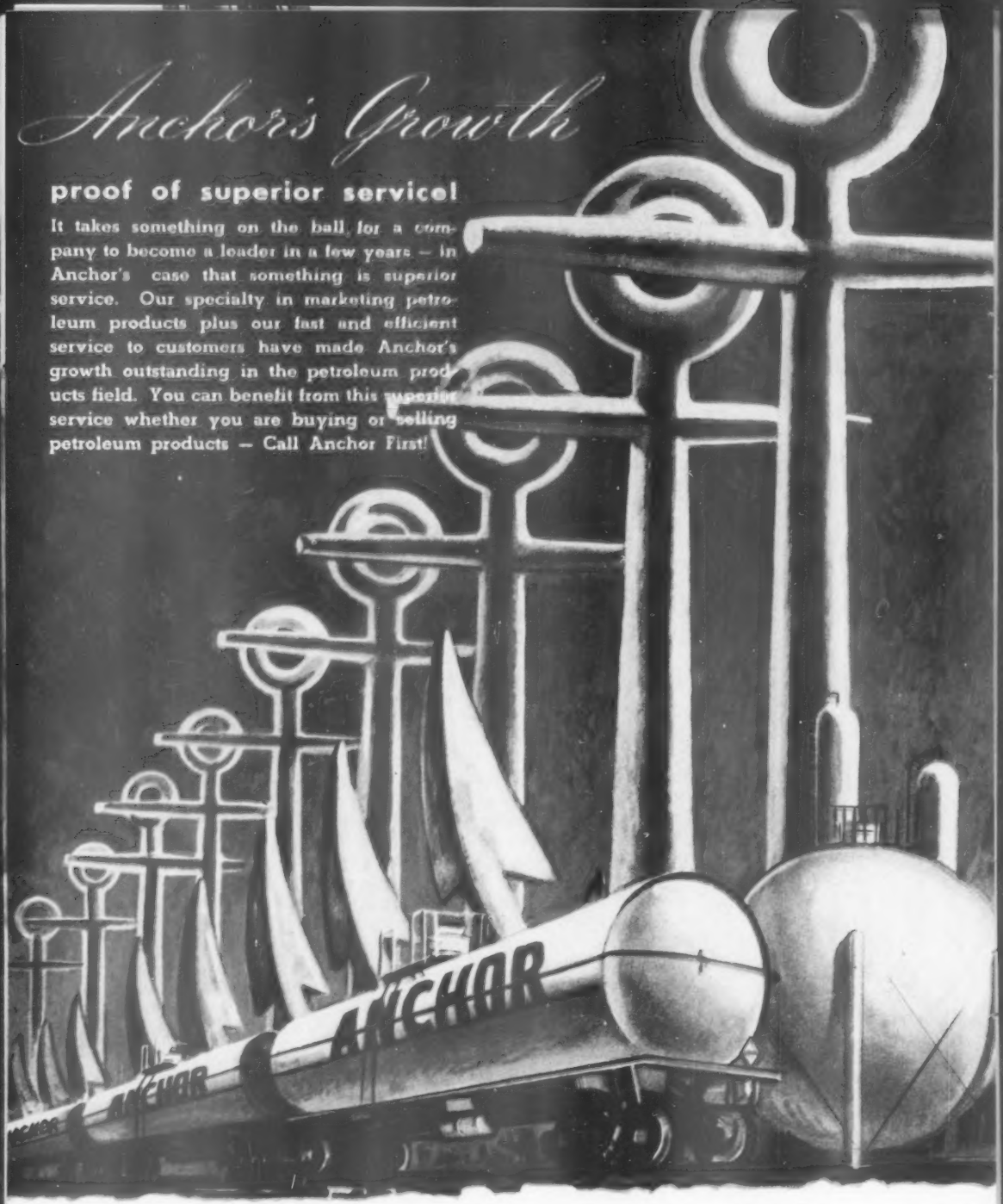
In the oil business the Federal Trade Commission is doing all it can to soften competition in gasoline marketing. A case in point is the long-drawn and still pending action against Standard Oil Co. (Ind.) for reducing prices to a couple of Detroit jobbers in order to meet competition.

Because this case affects only a few dealers in one locality it has not received much attention by the industry as a whole. But it is important because (1) marketing brings in the money to keep the entire industry operating and if there can be no price competition in marketing the whole industry may stagnate; and (2) the concept of soft competition may spread throughout all business.

This concept of soft competition—of protecting the weak and small—is very alluring, particularly because we have seen little real hard competition for a decade. But it is a siren lure to rocks which can destroy the American competitive system.

THE oil industry boasts that it is the most competitive in the world and that it wants to stay that way. If so, it must fight for the right to compete.

In coming months the return of a buyers' market will see the revival of efforts to keep competition soft and easy through federal laws and rules. This movement must be stopped cold if the oil industry is to remain truly competitive.



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It takes something on the ball for a company to become a leader in a few years — in Anchor's case that something is superior service. Our specialty in marketing petroleum products plus our fast and efficient service to customers have made Anchor's growth outstanding in the petroleum products field. You can benefit from this superior service whether you are buying or selling petroleum products — Call Anchor First!

MERCHANTS OF PETROLEUM PRODUCTS

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PETROLEUM COMPANY of TULSA

THIS WEEK

Good footwork and . . .

Though there are a few tough spots for the rodman, surface geological parties consider this portion of the Williston basin easy to work. Open spaces make long shots possible, minimizing the number necessary and speed-

Stamina and patience . . .

ing up the whole operation of mapping marker beds. In this part of the basin, however, the beds dip only slightly and the slightest anomaly may mean an oil field, so extreme accuracy is required in measuring their elevation.

Are needed in this work

Shown here is a member of a Carter Oil Co. crew working near Beach, N. D., near the Montana border. In the white circle may be seen the party's automobiles, near which the plane table is set up.

INTERNATIONAL.—Aden Supreme Court rules that oil exported from Iran belongs to Anglo-Iranian Oil Co. . . . Italian firm owning seized tanker expected to appeal. . . . Ruling would turn over cargo of the Rose Mary to Anglo-Iranian. . . . New attempt to move oil out of Iran was reported in the making, this one also by small Italian firm. . . . ¶Public stock offering by Anglo-Iranian, its first in 30 years, oversubscribed by 12 times the amount asked. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,468,300 bbl. daily for week ended January 10, down 60,800 bbl. daily. . . . Total well completions gained 81 wells for the week to 820. . . . Wildcat completions were up 35 wells to 198. . . . Rotary rigs operating in United States on January 12 totaled 2,537, down 71 rigs from previous week and 263 less than on corresponding date last year. . . .

TRENDS.—Major product inventories decreased only 4,037,000 bbl. in the past 3 weeks compared with a reduction of 7,975,000 bbl. for the same weeks a year ago. . . . The gain in gasoline stocks for the past 2 weeks was almost 1,000,000 bbl. greater than in the corresponding period last year. . . . Major product stocks on January 10 were 22,925,000 bbl. greater than a year ago. . . . At the end of last September the increase over previous year was only 15,471,000 bbl. . . .

REFINING.—Indiana Standard announces it will begin work on its 30,000-bbl. Mandan, N. D., refinery in May. . . . Completion is scheduled for November 1954. . . . Lummus Co. selected as principal contractor. . . . ¶Retained profits of refining companies dropped last year, even though their profits before taxes showed an increase over 1951, survey shows. . . . ¶Bureau of Mines warns aviation gasoline still is in short supply, despite bureau report showing increased inventories. . . . ¶Pan-Am Southern places in operation at Destrehan, La., world's first commercial Fluid Hydroforming unit. . . .

GOVERNMENT.—Companies reject Truman's conditional offer to drop grand jury investigation into FTC's cartel charges. . . . Truman said "factors which have emerged" led him to the conclusion "national security might be best served" by dropping criminal proceedings. . . . President asked that civil proceedings be instituted, but action of Judge Kirkland indicates it will be Eisenhower's administration which decides future course. . . . ¶Privy Council in London rules petroleum and natural gas are two different substances. . . . Ruling was an appeal from Alberta court involving former Canadian Pacific lands in Leduc field. . . .

OUTLOOK.—PAD sees total demand this year for U. S. crude and products at 8,031,000 bbl. daily and supply at 8,066,000 bbl. daily. . . . This compares with Bureau of Mines forecasts of 8,000,000 bbl. for both demand and supply. . . . Exports, PAD says, will average about 338,000 bbl., imports 1,020,000 bbl., and crude runs to stills about 6,925,000 bbl. . . . ¶Imperial Oil official tells A.I.M.E. that intensive exploration in western Canada could result in the discovery of 25 billion barrels of oil before the end of the century. . . . Estimate is an average of figures obtained by using three different approaches. . . .

"Cartel" Deal Rejected

Government offers to drop grand jury investigation, but hinges proposal on conditions companies term impossible

Bertram F. Linz

WASHINGTON. — The federal administration last week was on the verge of dropping the grand jury investigation of an alleged international oil cartel, but within a few hours it appeared likely that the inquiry would go on as scheduled.

An offer by President Truman January 12 to drop the investigation made in a letter to Attorney General James P. McGranery was made subject to a condition which company counsels later in the day charged McGranery had turned into "blackmail" to force them to accept civil suits on a basis favoring the Government 100 per cent.

Final decision as to disposal of the case, however, was thrown into the lap of the incoming administration the following day when District Court Judge James R. Kirkland denied a new motion by the companies for dismissal of the grand jury but extended the deadline for meeting the subpoenas to January 28 to give, he said, an opportunity to both the outgoing and new administrations to review the matter.

A few hours after the President's letter was made public, attorneys for the companies met with McGranery at the Department of Justice and heard his demand that all the companies involved in the case agree as a unit to submit the documents called for under the grand jury subpoenas, and agree further to the immediate filing of a complaint in federal District Court asking relief. The latter would be filed in skeleton form so that the Government might later fill in the alleged practices from which relief was requested. As a final condition, the companies were to agree to withhold action against the complaint until 60 days after the last of the documents required under the subpoena had been produced.

Reaction emphatic . . . First to reject McGranery's demands was Arthur Dean, counsel for Standard Oil Co. (N. J.), who called it "a blank check to be used as he sees fit for as long as he wants to exercise it." There was no move to meet the deadline for acceptance of the offer set by McGranery for 11 a.m. the following morning, and 3 hours after the deadline the companies asked the District Court to dismiss the grand jury proceedings and quash the subpoenas in an "emergency plea."

Dean's description of the "furious, angry mood" in which McGranery met the lawyers indicated that the Department of Justice was bitter over the decision to abandon the grand jury investigation.

An NSC decision . . . That decision was reached at a meeting January 9 of the National Security Council, high policy-making body of which the President is chairman, and the Vice President, the secretaries of State, Defense, and Treasury, the chairman of the National Security Resources Board, and the Director for Mutual Security are members.

In conformity with the council's decision the President instructed McGranery to confer promptly with company representatives to determine if they would enter into a stipulation to produce the documents called by the subpoenas, and if they accepted that condition to terminate the grand jury investigation.

Whether the companies would have agreed was not determined. The condition was turned by McGranery into the demands which the companies refused to accept. Dean later indicated, however, that the question of documents would have had to be discussed more fully since some cover contracts and deliveries of high-octane gasoline to separate European countries and could not be produced without jeopardizing security interests.

"If it were not for the question of national security we would be perfectly willing to face either a criminal or civil suit," Dean said. "But this is the kind of information that the Kremlin would love to get its hands on. Once it is produced in compliance with the subpoena, it is public property."

Whitewash alleged . . . Federal Trade Commissioner Stephen J. Spingarn who for the past 6 weeks has been waging a one-man fight against what he termed organized propaganda to have the case dropped, charged a whitewash had been given the oil industry.

Spingarn disclosed that he had requested permission to attend the meeting of the National Security Council but had been turned down. He was a visitor to the White House January 12, apparently to make a last-minute effort to induce the President to keep the case going. He refused to give any details of the discussion.

The Government's case rested largely on the allegations made by the Federal Trade Commission in its long-suppressed "staff study" released last summer at the instigation of Sen. John Sparkman of Alabama, then Democratic candidate for the vice presidency.

Since publication of that report, Spingarn charged, the oil industry has been engaged in an organized, highly unethical campaign to discredit it and the commission.

"It would appear that honest and sincere men in the Government have fallen victim to the world-wide propaganda campaign conducted by the major oil companies since the publication of our report," Spingarn said. However, he said, he does not intend to resign his commission post but will serve until his term expires next September.

Department backing . . . Although the deliberations of the National Security Council are secret, it was established that the State and Defense departments strongly advocated the dropping of criminal proceedings.

The State Department pointed to the harm which the case already has done to our already weak relations with foreign countries and the aid and comfort the Communists would get from its continuance. The Defense Department also was concerned over the foreign situation, from the standpoint of its possible effects upon military oil supplies in the event of a war.

One of the factors which disturbed the oil industry was the thinly veiled intimation in some official circles that the grand jury investigation was a fishing expedition designed to lead not only to the bringing of a criminal prosecution but forays against the industry in other directions.

Collision of policies . . . There were many other factors which influenced government agencies to seek termination of the investigation, largely in the field of conflicting governmental policies which it would emphasize and the very real possibility that it would create new and insurmountable difficulties for American oil companies seeking concessions abroad.

Observers pointed out that in this case enforcement of the antitrust laws would collide head on with the efforts

of the administration to induce American capital to go abroad, which would probably collapse if the antitrust laws were extended to the foreign field. At the same time, a criminal indictment here against the companies could be used by foreign producing countries in which the companies operate as a pretext for invalidating concessions and contracts.

The letter . . . The President's letter to McGranery was as follows:

"Dear Mr. Attorney General:

"As a result of factors which have emerged since the institution of the current grand jury investigation of the international activities of the major oil companies, I am of the opinion that the interest of national security might be best served at this time by resolving the important questions of law and policy involved in that investigation in the context of civil litigation rather than in the context of a criminal proceeding. However, I believe that this would be the case only if the companies involved agreed to the production of documentary material which the companies are required to produce under an existing order of court based on grand jury subpoenas.

"Consequently, I ask that you promptly confer with representatives of the companies to ascertain if they will agree to enter into a stipulation to that effect. If they will, I ask that a civil proceeding be instituted accordingly and that appropriate steps be taken to cause the termination of the pending grand jury proceedings.

"Sincerely yours,

"Harry S. Truman."

While Truman thus asked for the institution of civil proceedings, the final determination of the policy to be followed will be in the hands of the new administration, which can follow the line laid down by the outgoing President, or drop the whole matter as not worth while, or adopt any course in between.

Tidelands Legislation

Senators Daniel of Texas and Holland of Florida introduce bills returning submerged-lands administration to states

WASHINGTON.—Lines for the drive to return the oil-bearing tidelands to the states were laid down in the Senate last week when 40 members, headed by Sen. Spessard L. Holland of Florida, reintroduced the Holland quitclaim bill which was passed by the last Congress and vetoed by President Truman.

At the same time, Sen. Price Daniel of Texas, former attorney general of that state who joined in sponsorship of the Holland bill, introduced another measure which not only would quitclaim the submerged areas within the claimed boundaries of the coastal states but would provide for administration of activities of the Continental Shelf.

Daniel's bill would leave leasing and management of the exterior belt in the hands of the states subject to approval by the Secretary of the Interior and would give the states 37½ per cent of all revenues from the Continental Shelf—the same as they now receive from leases on federally owned lands—with the remainder to be applied to reduction of the national debt.

The 40 senators who sponsored the Holland bill, 15 of them Democrats, joined in a statement in which they deplored the tendency toward federalization and declared a "very strong feeling" that this trend must be halted.

Trend feared . . . "We can ill-afford to set up a federalized bureau here in Washington which shall direct what shall be done and what shall not be done over the thousands of miles of coast line of all the maritime states, and probably later to have jurisdiction over the lands and waters defined as inland waters, and over the lands and waters of the Great Lakes out to the state boundaries," Holland told the Senate. "If we do, we will have gone further astray in the field of federalization than in any other field where we have proceeded heretofore."

Holland pointed out that no oil has been discovered off the coast of Florida and so is not a factor so far as that state is concerned but, he said, speaking for the group behind the bill:

"We are all distinctly of the feeling that it is in the interest of good government and sound public policy to again confirm to the states complete jurisdiction and control of their own waters and the lands lying under those waters out to the constitutional boundaries of the states because the states are confronted with the doing of so many things and the performance of so many duties which relate to that little shoestring of land and water and because likewise the question of the enjoyment of the use of that strip of land and water relates largely to the development and serving of the coastal communities and the states which are affected."

Speaking of his own bill, Daniel said there is no conflict with the Holland measure. The only difference, he explained, is the additional title which would also dispose of the problem as it relates to that portion of the Continental Shelf lying outside the original state boundaries and thus speed development of that area.

Warning issued . . . A warning that enactment of quitclaim legislation

Busy Road Through the Swamp Country

Oil operations often must be conducted where roads don't go, and in those cases oil men build their own roads. The swamp lands near Houma, La., are an example, and this is the plank trafficway built by Cities Service Oil Co. to serve its drilling sites and production activities.

WATCHING WASHINGTON

Bertram F. Linz

Controls on Way Out

Quick extinction of price and wage controls was in sight this week as President Dwight D. Eisenhower prepared to take over the reins of government.

The tip-off on the new administration's policy came from Rep. Jesse P. Wolcott of Michigan, who will be chairman of the House Banking Committee. With Republican majorities in both houses of Congress and support from many southern Democrats, it is not believed any real opposition can be mustered against repeal of the regulations in advance of their present statutory expiration April 30.

Eisenhower is said to believe the present stabilization program has fallen apart and the national economy is strong enough to prevent another inflation without government controls.

The future of the whole defense program will come up for hearings before House and Senate committees early next month. Congressional leaders do not know yet what Eisenhower will ask in the way of extension of the Defense Production Act, but so far as stabilization is concerned the concensus is that it will be impossible to draft workable legislation and the new President will not even seek standby authority to reimpose controls.

Representatives of organized labor and professional spokesmen for consumer groups are expected to demand continuation of price and wage curbs, but with little prospect of success. Nothing less than a real emergency could tempt Congress to continue a controlled economy at the present time.

Intermediary Taboo

There will be no "assistant president" like John R. Steelman in the new Eisenhower administration.

While Eisenhower will seek and receive advice from many sources, he is expected to rely more fully on the members of his Cabinet to carry out his policies without the aid of an intermediary who can overrule department heads.

A commitment to this effect is believed to have been secured by Martin P. Durkin before he accepted the post of Secretary of Labor.

Durkin, incidentally, is a different type of man from his predecessor, Maurice J. Tobin, who showed little interest in his job. Always at his office before his staff arrives and until after they have gone home, Durkin says he sees no reason to change his habits in his more important post.

The new labor secretary feels it is his job to represent the whole public, not just organized labor. Men who know him expect him to open his door to business and to be more cooperative with the Secretary of Commerce in dealing with major problems of industry, business and labor.

A Break for PAD

New Interior Secretary Douglas McKay will take over his job, possibly this week, with at least a rough idea of what the Petroleum Administration for Defense is and what it does.

When he came to Washington January 7 to get an idea of the problems he was going to face, McKay met with retiring Secretary Oscar L. Chapman for a general discussion of the department and then started his study of the various bureaus with a conference with Deputy Petroleum Administrator J. Ed Warren and the heads of the PAD foreign, domestic, and program branches.

In such a meeting, of course, McKay could not attempt to acquaint himself with the details of PAD operation, but Warren and his associates gave him the highlights of PAD's unique position in the Interior Department and the defense organization, how it works, and what it does.

So far, McKay has not disclosed how he stands on oil issues which for some years have been political footballs, other than to say he supports the policies of the Republican party. But as governor of Oregon he has been interested in the tidelands controversy. Also as governor of a state for which the department had river-control plans, he undoubtedly has learned considerable of how Washington bureaucracy operates, and as a business man he knows the problems of management. All of this will come in handy when he takes over the big desk on the sixth floor of the Interior building.

would only result in a new round of litigation which would wind up in the Supreme Court 5 years hence was voiced by Sen. Clinton P. Anderson of New Mexico.

Anderson declared that his own bill for government administration of the tidelands, with the states to get 37½ per cent of the revenues from the area within the 3-mile limit, with no exception for Texas, would give "an immediate, equitable solution to the so-called tidelands problems and permit immediate development of those oil-rich areas in the national interest." He maintained that from the standpoint of the three states principally affected "this might be a safer solution than quitclaim legislation."

"After all," Anderson asserted, "the Supreme Court has not held that the federal Government has absolute ownership, but only that the federal Government has paramount rights in these areas. There are many who believe that the federal Government cannot give away what it does not own, and hence that it cannot give to the states title to these lands. A legislative act attempting to do so would probably be immediately challenged in the courts and finally end up with another review before the Supreme Court.

"That may be proper procedure, but it could easily require 5 years or more for its completion. In the meantime there should be interim operation of these lands. My bill is designed to permit such interim operation without attempting to decide the major question of final ownership of these areas."

Avgas Warning Issued

WASHINGTON.—Bureau of Mines figures showing apparently heavy inventories of aviation gasoline do not mean that the avgas situation has suddenly improved, it was warned last week by officials of the Petroleum Administration for Defense.

While a sudden increase in October brought inventories to 4,750,000 bbl., the movement was of small significance and, in fact, was sharply reversed in November, officials said. Over the past year inventories have ranged from a low of 3,800,000 to a high of 4,700,000 bbl., averaging from 4,200,000 to 4,300,000 bbl., and the October increase was in line with the normal trend. November stocks, it is expected, will be 500,000 to 600,000 bbl. less.

The stock figures cover both commercial and military aviation gasoline of 100 and higher octane, and PAD officials said the increase in October actually was less than expected in view of the fact that 30 plants are now in

operation and production is expanding.

At the same time, they pointed out, only about half of the gasoline carried in the stock figure is considered "available," amounting roughly to a 10-day supply. The figures do not include stocks held by the military but only those from which military and commercial requirements are filled.

Fuel-Oil Report

Committee analyzes residual trends over past 6 years

WASHINGTON.—A decline in the selling price of residual fuel oil from 96.4 per cent of the price of crude at the well head in 1946 to 72.5 per cent in 1951 is the cold economic factor which has largely dictated the declining yield of Bunker C fuel oil per barrel of crude run in the past 6 years.

Another, but minor, contributing factor to the decline is the upward trend in average gravity of the crude stream available to refiners, from 34° to 34.7° on domestic oil and 26.8° to 29.6° on imported crudes, it was reported this week by a National Petroleum Council committee headed by B. Brewster Jennings, president of Socony-Vacuum Oil Co.

On the other hand, the committee said, greatly increased volumes of crude oil run to stills to meet large gains in demands for gasoline, middle distillates, and specialties have tended to keep the volume of residual production by domestic refineries relatively stable, with an increase of 5.5 per cent recorded in 5 years.

The council study was made at the request of former Deputy Petroleum Administrator Bruce K. Brown to bring out the trends of domestic production, importation and types of usage; reasons for lower yields of fuel oil; the probable bedrock minimum yields to be anticipated from U. S. refineries, and what impediments may exist that would prevent an increase in yield per barrel of crude run.

The report originally was submitted to the NPC at its December 9 meeting but was withdrawn for a more up-to-date analysis of the situation in Districts 2 and 4.

Oil-Tax Collections Jump

WASHINGTON.—Collections from the four federal oil taxes last year showed an increase of 25 per cent over 1951, edging close to the billion-dollar mark.

Figures compiled by the Internal Revenue Bureau showed receipts for the first 11 months of $902,317,519 compared with $658,590,412 for the same period in 1951.

Most of the increase was accounted for by the higher gasoline tax, which returned $775,172,242 against $554,606,359 in the preceding year. Receipts from lubricating oil and pipeline transportation also increased, however, the former to $85,349,780 from $79,998,318 and the latter to $28,573,015 from $23,981,774, and the new diesel-oil tax returned $13,222,723 for the first full year of operation, or approximately $1,100,000 a month.

The bureau reported that receipts for the month of November alone included $75,420,994 from gasoline against $57,999,733 for the same 1951 month; $5,826,278 from lubricating oils against $6,670,025; $2,352,776 from pipe-line transportation against $2,524,391, and $1,056,214 from diesel oil against $3,991.

Major Products Exports Up

WASHINGTON.—Exports of major oil products jumped to an average of 280,900 bbl. daily during the week ended December 19 from 197,900 bbl. in the preceding week, according to figures compiled by the Petroleum Administration for Defense.

The heavier movement was due to an increase of 40,000 bbl. daily in distillate shipments and lesser gains in motor gasoline, kerosine, and residual. Aviation gasoline exports showed a slight decline.

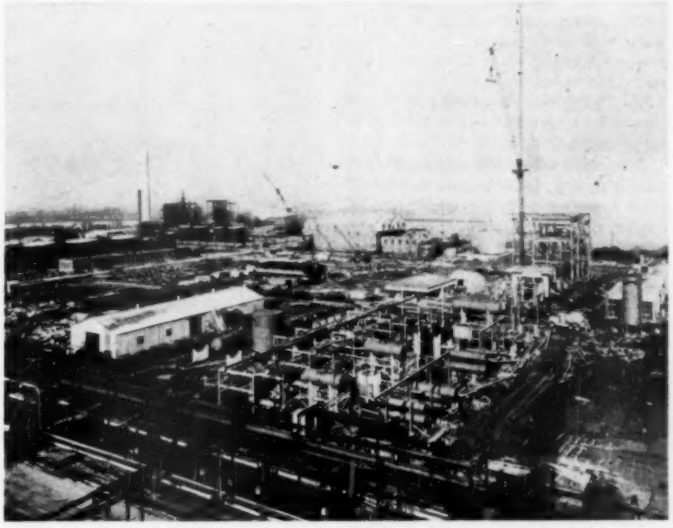
Details of the week's exports, compared with the preceding week, and averages for the 4 weeks ended December 19 are shown in the accompanying table, in thousands of barrels daily.

	Week ended— Dec. 19	Dec. 12	Average 4 weeks
Aviation gasoline	29.7	31.9	39.2
Motor gasoline	67.0	52.4	56.7
Kerosine	20.6	...	12.3
Distillate	114.9	74.2	83.3
Residual	48.7	39.4	41.2
Total	280.9	197.9	232.7

Retained Profits Decline

WASHINGTON. — Before-tax profits of refining corporations increased by 8 per cent between the second and third quarters of 1952, but after taxes they showed a drop of 4 per cent, according to a joint survey by the Federal Trade and Securities and Exchange Commissions.

The commissions' study put third-quarter refinery profits at $649,000,000 compared with $602,000,000 in the



Getting Ready for World's Largest Fluid Cat Cracker

Foundations for a gas-recovery plant and hydrogen-sulfide removal equipment are well under way at Gulf Oil Corp.'s Philadelphia refinery where M. W. Kellogg Co. is erecting the world's biggest Fluid catalytic cracker. The unit will have a rated capacity in excess of 60,000 bbl. per day. Steel work for the cracking unit may be seen going up in the background. The Philadelphia refinery at present has a crude-charge capacity of 107,000 bbl. daily and thermal cracking facilities with a capacity of 31,200 bbl. per day.

second quarter, before taxes, but after accounting for taxes only $465,000,000 was left compared with $485,000,000.

The refining industry was one of 9 of the 23 industries surveyed which showed increases in before-tax profits and one of 8 showing decreases in profits after taxes.

Oil Girds for T.V. Fight

WASHINGTON.—The Federal Communications Commission will resume hearings soon on proposals to provide channels for theatre-television service with the oil industry prepared to resist vigorously any assignments that will jeopardize the use of microwave facilities along pipe lines.

The industry's position is that it has pioneered in the development of microwave facilities and has proved their dependability, economy, and efficiency, and it is in the public interest to continue that service without interference.

Witnesses will tell the commission that suitable equipment has not been developed for theatre television, and, since there are no basic engineering reasons for use of the lower microwave frequencies for that service, experimental work should be directed toward the use of frequencies not now occupied.

At the present time 22 pipe-line companies have invested $17,221,000 in 14,584 system miles of microwave systems with 586 stations in use. Plans for expansion of 17 of these companies include an expenditure of approximately $20,000,000 for an additional 16,000 system miles and 616 added stations in the near future.

In system miles, the petroleum-service microwave facilities now exceed all other microwave systems combined, including common-carrier relay, by 50 per cent, and within the next 10 years the industry expects the total microwave system mileage serving pipe lines alone will exceed 50,000 miles.

Fuels Meeting Called

WASHINGTON.—Members of the military fuels technical advisory committee have been called to meet with officials of the Petroleum Administration for Defense January 28.

The major matters to be discussed are a procedure for determining the extent to which old crude-oil distillation equipment is being retired as new units are completed under the expansion program and the effect of proposed changes in specifications for jet fuel on availability of the product.

PAD Sees Record Year

Total demand for crude and products placed at 8,031,000 bbl. daily in 1953—slightly above Bureau of Mines figure

WASHINGTON. — The Petroleum Administration for Defense last week estimated that total demand for crude and products this year will average about 8,031,000.

This is about 31,000 bbl. daily over the total demand predicted by the Bureau of Mines a week earlier *(The Oil and Gas Journal, January 12, page 63)*.

PAD places domestic demand at 7,693,000 bbl. daily, as against the bureau's forecast of 7,646,000 bbl. daily, and exports at 338,000 bbl., against 354,000 bbl.

New supply is put at 8,066,000 bbl. daily, against the bureau's 8,000,000 bbl., with domestic production of crude and natural-gas liquids at 7,046,000 bbl., against 6,962,000 bbl., and imports of 1,020,000 bbl., against 1,038,000 bbl. Crude runs to stills were put by PAD at 6,925,000 bbl. daily, while the bureau estimated them at 6,863,000 bbl.

Percentage comparison . . . Percentagewise, the differences in the domestic demand forecasts of PAD and the Bureau of Mines were: Total domestic, PAD 5.7 per cent, bureau 4.9 per cent; gasoline, PAD 5.1 per cent, bureau 5.5 per cent; kerosine, 5 per cent and 4.1 per cent; distillate, 10.8 per cent and 7.7 per cent; and residual, 3 per cent and 2.5 per cent. PAD estimates that exports will be 20.7 per cent under 1952, against 16 per cent.

The PAD estimate included an increase of 16.6 per cent in stocks of products and a decline of 4 per cent in stocks of crude by the end of this year. Product stocks would rise from 401,400,000 bbl. December 31, 1952, to 418,000,000 bbl. on the same date in 1953, whole crude stocks would decline from 274,000,000 to 270,000,000 bbl.

Details of the PAD estimates are shown in the accompanying table.

United States Petroleum Forecast

	1952		1953	
DEMAND	Thousands bbl. daily	Per cent inc. over 1951	Thousands bbl. daily	Per cent inc. over 1952
Domestic demand:				
Gasoline	3,146	+5.5	3,305	+ 5.1
Kerosine	341	+ .9	358	+ 5.0
Distillate	1,318	+7.6	1,460	+10.8
Residual	1,514	−2.0	1,560	+ 3.0
Other	959	+1.7	1,010	+ 5.3
Total domestic	7,278	+3.5	7,693	+ 5.7
Export	426	+ .7	338	−20.7
Total demand	7,704	+3.3	8,031	+ 4.2
SUPPLY				
Imports: Crude	570		620	
Products	381		400	
Total	951		1,020	
Crude production	6,262		6,401	
Natural gas liquids	604		645	
Total supply	7,817		8,066	
STOCK CHANGE	113		35	
CRUDE RUNS	6,667		6,925	
Capacity	7,565		7,970	
Per cent operated	88.1		87.0	
CLOSING INVENTORIES (Millions of barrels)	12-31-52	Increase over 1951	12-31-53	Increase over 1952
Gasoline	137.0	+ 2.1	142.0	+ 5.0
Kerosine	27.5	+ 0.4	28.0	+ 0.5
Distillate	101.0	+14.4	109.0	+ 8.0
Residual	47.5	+ 4.6	49.0	+ 1.5
Other	88.4	+ 1.6	90.0	+ 1.6
Total products	401.4	+23.1	418.0	+16.6
Crude oil	274.0	+18.2	270.0	− 4.0
Total crude and products	675.4	+41.3	688.0	+12.6

Discovery Forecast

Mackenzie believes expanded oil search in western Canada might find 25 billion barrels before end of this century

DULUTH, Minn.—Discovery of 25 billion barrels of oil in western Canada before the end of this century is possible with an expanded oil-exploration program.

This estimate is an average of the figures provided by three different approaches, W. D. M. Mackenzie told a meeting here of the American Institute of Mining and Metallurgical Engineers. Mackenzie is manager of the western producing division of Imperial Oil, Ltd.

Present reserves in western Canada are between 1.7 and 2 billion barrels, or more than 23 times what they were in 1946, just before the discovery of Leduc field, he said.

Mackenzie's three approaches were these: An analysis of the discovery history of the Mid-Continent area of the United States, which compares geologically with western Canada; application of the world average oil-accumulation factor per cubic mile of sedimentary rock; and a projection of the current discovery rate in western Canada over a 40-year period.

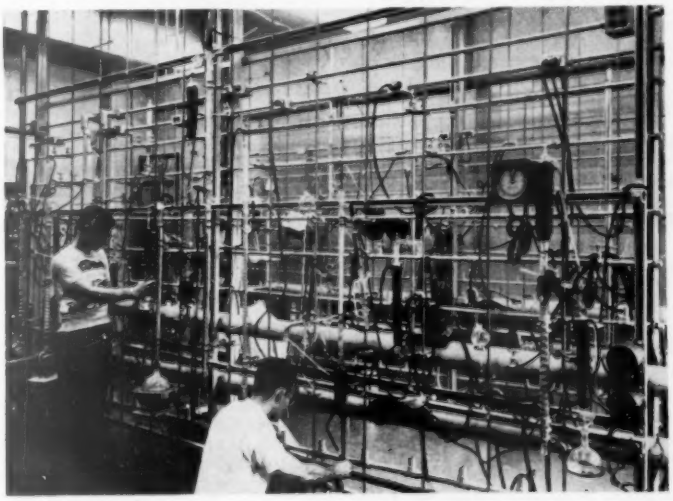
Mid-Continent comparison . . . "Let us take 46 billion barrels as being the result of some 30 to 40 years of exploration effort in the great basin of the United States and make a simple comparison with western Canada," Mackenzie said. "We have to make some adjustment for size and an allowance for the fact that exploration will go somewhat slower in the Northwest Territories of Canada . . . to me that judgment factor looks like about 60 per cent so that by a simple comparison I arrive at a figure of 28 billion barrels reserves for western Canada.

Accumulation factor . . . "It has been said that in the sedimentary basins of the world the average accumulation factor is 30,000 bbl. per cubic mile of sediments. The volume of western Canada basin is roughly 1,000,000 cu. miles, so that by this approach we arrive at the reserve of 30 billion barrels.

Discovery projection . . . "The third method of guessing," Mackenzie said, "is applying the current rate of finding to a 40-year period. Naturally there are cautions to be observed in doing this, but I believe many of the errors are compensating.

"I roughly estimate that the industry is now discovering at the rate of 400 million barrels per year, so in 40 years we should have found 16 billion barrels. Now by three different approaches we have obtained figures of 16 billion, 28 billion, and 30 billion. The average is 25 billion."

Bearing in mind the many problems of exploring for oil in western Canada, Mackenzie added, "I have no doubt that the oil will be more difficult to find in the future, but offsetting this I feel confident that the effort will be greater and the tremendous wealth of subsurface knowledge which will be obtained will give us technical aids which we cannot today envisage."



New Petrochemicals Research Lab in Operation

Investigations into development of new products, new uses for existing products, and improvements in processes to provide greater efficiency and yield are being continued by Celanese Corp. of America in its recently completed modern research laboratory at Clarkwood, Tex., near Corpus Christi. Here lab technologists are setting up and checking distillation columns in the lab's distillation room. The new research center, which replaces temporary buildings built during World War II, included 11 separate laboratories, 27 offices, and library, conference, drafting, and duplicating rooms. Celanese first began petrochemical research in 1934 at its Cumberland, Md., plant. This early work led to construction of the huge Bishop, Tex., plant, and the research center was moved to Clarkwood in 1946. The Clarkwood center, which handles all Celanese petrochemical research, is under the direction of Henry K. Dice. Members of the company's original research team include Dice, S. B. Jeffries, supervisor of the analytical department; C. J. Maxwell, head of process development and engineering; and V. T. Anwyll, manager of the new Edmonton, Alta., plant now under construction by the affiliated Canadian Chemical Co.

Gas-Rights Sale

First such sale without oil rights scheduled by Alberta

EDMONTON, Alta.—A sale of natural-gas rights without accompanying oil rights, the first of its kind in Alberta, will take place here February 6.

Up for sale will be a 6,200-acre parcel and a 6,499-acre tract in the Fort Saskatchewan district and a 36,640-acre parcel in the Pakowki Lake area. The first two mentioned parcels are about 25 miles east of Edmonton in the vicinity of a site where a $17,500,000 nickel refinery currently is under construction. The Pakowki Lake area is in southern Alberta, and it is from this area that gas now is being

exported to Montana for the use of Anaconda Copper.

An Alberta mines and minerals department spokesman stated that in previous government sales companies have bid for petroleum and natural-gas rights. Usually these rights were offered in small parcels more suited for oil exploration than the search for gas.

Government regulations permit one oil well to be drilled on a 40-acre parcel. Gas wells customarily are drilled on 640-acre parcels, and as a result, those companies wanting to drill for gas found it difficult to acquire sufficient acreage to warrant a drilling program.

By providing reservations large enough to accommodate the searchers for gas, the new government regulations have been viewed as aimed at encouraging natural-gas exploration in Alberta.

Gas licenses are to be offered only in areas where gas is believed to be present and the possibility of discovering oil is considered remote. Provision is made in the regulations for companies to acquire oil rights also in the event that petroleum should be discovered incidental to the search for gas.

New Oil Center

Alberta crude could make a major oil port of Vancouver

VANCOUVER, B. C.—Growing production in Canada and the movement of the crude to Vancouver could make this seaport an important oil-export center, John R. White, executive vice president of Imperial Oil, Ltd., said here.

Addressing the Vancouver Board of Trade, White pointed to the development of Gulf Coast ports.

"American oil first met ocean navigation on the Gulf of Mexico and the rivers flowing into it. That region now has some of the largest refineries and petrochemical industries in the world."

"The first meeting place of Canadian crude and the ocean is here, at Vancouver," he said, "a fact which may mean a great deal. The outcome will depend largely on the size of Canadian oil production, but I will say this, that in designing our own new refinery here we left considerably more room for growth than is normal."

"We feel that Vancouver would well become an important oil-export center, since it is strategically located to supply the Pacific area," White said.

Even if major international trade should not develop, White said, British Columbia's growth would sooner or later make use of any surplus capacity. Already, he said, this province has the highest per capita consumption of petroleum products in Canada.

Price outlook . . . Product prices may rise on the West Coast during the coming months, White said, but completion of the Trans Mountain pipe line from Alberta in August will bring prices back to their present levels as crude-oil deliveries increase.

The present price structure on the West Coast is artificial, White said. "California oil firms are currently in the fantastic position of selling crude at the controlled price, while purchasing replacement crude at prices reportedly 65 cents or more per barrel above the crude they sell."

If increases in the ceiling price are granted, or if the "entire United States price-fixing program" is abandoned, there would be "a tendency for petroleum prices to rise," White declared.

Petroleum Defined

Privy Council rules natural gas is a separate substance

EDMONTON, Alta.—A Privy Council court decision in London that petroleum and natural gas are two separate substances has given Michael Borys, Leduc district farmer, a moral victory, but not the fortune he hoped for.

Borys owns a farm in the heart of the rich Leduc oil field, 20 miles south of Edmonton. He contended that the original mineral rights reserved to Canadian Pacific Railway covered only petroleum and therefore not natural gas.

Imperial Oil, Ltd., secured the mineral-rights lease from the C.P.R. and began drilling on Borys' land. Borys by court order stopped the drilling while he took his case to Canadian courts. While appeals to the Privy Council no longer are permitted, Borys' case went there because the appeal was made before Canadian parliament made Canada's supreme court the last court of appeal in Canada.

The Privy Council ruled that Borys owns the gas under his farm, but that Imperial could extract the crude oil from beneath the surface location, even if Borys' natural gas had to be used in the extraction process.

The appeal was regarded in Alberta as a test case affecting title in which the petroleum rights alone are reserved to a party other than the surface owner. It is estimated that about 5,000 titles in Alberta were affected, many of these not in areas where oil has been found.

Background . . . When the case went to the courts, oil circles in Alberta were concerned with the possible effect of a court ruling. As it is impossible to extract oil without co-existing natural gas, oil men feared there would be considerable litigation involved should it be ruled that compensation must be made for removal of natural gas along with oil.

In the first decision on the case, a local court ruled that the term "petroleum" did not include natural gas and it enjoined Imperial from producing or "interfering with" Borys' natural gas *(The Oil and Gas Journal, May 31, 1951, page 66)*.

This decision, however, was overruled on appeal, the appellate court holding that "petroleum" covered both crude oil and natural gas *(The Oil and Gas Journal, February 18, 1952, page 97)*. It was after this decision that the case was taken to the Privy Council in London, recognized at that time as the "supreme court" of the British Empire.

Reservations Auctioned

EDMONTON, Alta.—The Alberta government has sold by auction oil and gas exploration reservations on 130,000 acres for $270,907.

Sale of reservations is to be differentiated from the sale of oil rights by the government. In the latter, a company can proceed to drill on all the properties for which it purchases rights. In the former, a discovery means 50 per cent of the reservation has to be turned back to the government and the company's 50 per cent is selected in checkerboard pattern.

In this recent sale the highest price, $233,856, was paid by Royalite Oil Co., Ltd., for reservations on 60,000 acres 10 miles southwest of High Prairie, which is on the eastern edge of the Peace River district in northern Alberta.

Shell Lacross Exploration, Ltd., paid $20,017 for 38,000 acres 60 miles south of Lloydminster and $17,033 for another 32,000 acres in the same area. Lloydminster is a heavy crude producing area on the Saskatchewan Alberta border.

No bids were received for reservations on 320,000 acres in the Fort Vermilion area of far northwestern Alberta.

ROCKY MOUNTAIN

Action at Mandan

Indiana Standard to begin work on new plant in May

MANDAN, N. D.—Standard Oil Co. (Ind.) will begin construction of its new 30,000-bbl. refinery here this spring.

T. E. Stockdale, recently appointed refinery manager, said Standard took up its options last week to buy a 900-acre site just north of the city. The site had been under option since June 1952. Stockdale said soil conditions and other factors affecting construction and operation had been investigated and found favorable.

Work this spring, he said, will be confined to grading, pouring foundations, and laying railroad track. Installation of the major units will not begin before 1954. These will include facilities for catalytic cracking, crude distillation, polymerization, vapor recovery, and finishing. Initial operation of the refinery is scheduled for November 1954.

The company also announced that Lummus Co. has been selected as the prime contractor for the new refinery.

Crude supply . . . Crude oil for the refinery will come principally from the Tioga area of North Dakota where Amerada Petroleum Corp. has been feverishly developing its Beaver Lodge and other discoveries.

The crude will be carried to the Mandan plant through a 170-mile, 12-in. line to be laid from near Tioga by Service Pipe Line Co., a subsidiary of Indiana Standard, in 1954 *(The Oil and Gas Journal, July 7, 1952, page 120).*

NEW REFINERY will receive crude through new line from Beaver Lodge fields 170 miles to the northwest. New products line will be built east to Indiana Standard's present Moorhead, Minn., terminal.

Engineering for the line will be carried out this year.

Products . . . Principal products of the new refinery will include three grades of gasoline, kerosine, burning oils, diesel fuel, and residual fuels. No asphalt products or road oils will be manufactured due to the nature of the Williston basin crude and the refinery processes to be employed, Stockdale said.

Products will be shipped from the plant by rail, truck, and by a new pipe line to Moorhead, Minn. It will connect there with Standard's present Northwest products line originating at Whiting, Ind., and terminating at Moorhead. Spokesmen for the company have stated definitely that this line will be built but as yet have set no date nor announced the size.

GULF COAST

Third Try—Success

Texaco hits on Bay Junop 25 years after first lease

Wilma Van London

HOUSTON.—Perseverance has paid off for The Texas Co. in its exploration program in South Louisiana.

On January 10 Texaco and Union Oil Co. brought in the 3-2 Bay Junop wildcat in Terrebonne Parish. Although the well flowed at a rate of only 63 bbl. of oil daily, it had a gas-oil ratio of 65,731 to 1, indicating an immense gas reserve. Production is from perforations between 12,666 and 12,682 ft.

The successful wildcat was the twenty-eighth test drilled in the area and marked the third time in 25 years that The Texas Co. had entered the area to drill for oil.

In November 1928 The Texas Co. leased nine salt domes, including the Bay Junop dome, from Louisiana Land & Exploration Co. It completed its first dry wildcat in January of 1930 and drilled three more dry holes before the end of 1931. The wells were completed at depths between 4,935 and 7,034 ft.

In 1933, the lease was transferred back to Louisiana Land & Exploration Co. and was taken up by another oil company which drilled a dry hole to 6,200 ft. In December 1933, The Texas Co. reentered the dome and drilled 3 dry holes ranging from 4,293 to 7,840 ft. A period of 7 years elapsed before another oil company entered the area and completed its well as a dry hole.

The fourth oil company to become interested in the structure spudded in March 25, 1946, and drilled a total of 11 wells before quitting in November 1947. A little more success was experienced by this operator, however, as two of his wells had small oil shows but not in commercial quantities.

In November 1950, The Texas Co. entered into an operating agreement with Union Oil Co. of California, The Texas Co. being operator. They drilled seven successive dry holes. However, the eighth well resulted in the successful 3-2 Bay Junop well.

A total of 27 dry holes had been drilled in this area between January 27, 1930, and January 10, 1953, or a total of 23 years to the month.

The discovery well is on the most northern part of the dome structure. The dry hole farthest from the discovery well is only about 3 miles to the south.

Nearest production is 10 miles east, in Dog Lake field.

Shell Lets Repair Contract

SHERIDAN, Tex. — Shell Oil Co. has awarded a contract to Fluor Corp., Ltd., to repair an estimated $350,000 in damages to a Shell-operated cycling plant here.

The damage was caused by an explosion and fire January 7 in which four men were killed and three injured. Cause of the blast has not been announced.

Damaged facilities were in the plant's fractionation and distillation sections. It is expected that the repair work will take about 4 months.

Shell owns about 70 per cent of the $10,000,000 plant, which is located about 90 miles southwest of Houston in Colorado County. Processing capacity is about 90,000,000 cu. ft., and liquids recovery about 200,000 gal. daily.

Your 1952 Index is Ready

The Oil and Gas Journal's 1952 index is printed and is now being mailed.

To get your copy merely drop a letter or post card to: Circulation Manager, The Oil and Gas Journal, Box 1260, Tulsa. The index will be sent you by return mail. It is provided free to all Journal subscribers.

The index gives page and issue number of all engineering and operating articles and all principal news stories of the entire year, listed both by subject and by author.

New Lube, Fuel Tests

Radioactive piston-ring method valuable in wear studies, S.A.E. told; progress in other new techniques reported

DETROIT.—The increasing severity of operating conditions in current and future engines of all types is of growing concern to the oil industry. A number of new techniques for evaluating products to be subjected to these severe conditions have resulted from the accelerated research efforts along these lines.

Three such tests claimed considerable attention last week at the annual meeting of the Society of Automotive Engineers. The radioactive piston-ring method is now contributing important evidence on the role of lubricating oils in controlling engine wear. The relative importance of preignition and detonation in high-compression engines may well be clarified as the result of a new method for identifying the former. A third new technique, a low-temperature sludging test promises further contributions to the means of evaluating lubricating oils for current and future use.

Lubes and engine wear . . . Increased attention has recently been given the concept that lubricating oils and lubricants in general play a very important part in controlling engine wear. "Lubricants—The Surface Savers," a paper by J. F. Kunc, Jr., and J. P. Hamer, of Standard Oil Development Co.'s Esso Laboratories, reviews that company's investigation on the subject. The authors discussed the effects of engine, transmission, and rear-axle lubricants and greases on both mechanical and chemical wear.

Laboratory and field tests employing the radioactive piston-ring technique originated by Atlantic Refining Co. have shed new light on the effects of varying operating conditions and crankcase-oil characteristics on piston-ring wear.

On one point alone, research groups have recognized the tremendous influence of engine operating temperatures on both the rate and type of wear. The wear rate in a single-cylinder engine is noted to increase very sharply as the engine jacket temperature drops below 120° F. The rate at 60° F. is four times that at 90° F. and eight times that at 120° F.

Most of the wear is chemical in nature, and when the engine temperature rises above the dew point of the gases, water, and other potentially corrosive materials, the wear rate appears to be primarily mechanical in nature.

Some new light on the effect of viscosity on the rate of mechanical wear has also resulted from the radioactive piston-ring technique. The authors report that data obtained by the Esso Laboratories show that at least in some engines and under certain operating conditions low-viscosity oils give substantially less wear than those of higher viscosity. Testing four uncompounded mineral oils varying from 36 to 59 viscosity SUS at 210° F., and refined in the same manner from the same general crude source, they found that piston-ring wear with the 36-second viscosity oil was less than two-thirds that obtained with the oil of 59 seconds viscosity.

In reducing corrosive wear, they found that detergent-inhibitor type additives can reduce engine wear substantially when poor-quality fuels are used. Direct radioactive wear tests conducted by California Research Corp. on a diesel engine burning a 1.0 per cent sulfur fuel, showed that a Series II type oil with roughly 16 per cent of additive showed only about 15 per cent as much wear as the same base oil without any additive.

The effect of such additives in controlling wear in a gasoline engine is dependent on type of service and quality of fuel. In stop-and-go operation, using a gasoline of poor-burning quality, a high-additive oil showed substantial returns in reducing wear. Under less-severe operating conditions with clean-burning fuels, however, the wear rate with both high-additive and straight mineral oils dropped substantially, and the relative advantage of using the detergent-inhibitor was much less.

Improved crankcase oils will be needed to meet the higher temperatures and pressures to be imposed by future engines. In the author's opinion these improved wear characteristics will come from the use of chemical additives or synthetic base oils rather than through further refinement of mineral oil base stocks.

While the synthetic-ester type lubricants are superior to petroleum mineral

This Wildcat Highlights West Texas' Deep Possibilities

One of the deepest producers in West Texas, this wildcat of Magnolia Petroleum Co. which discovered Magutex field in Northeast Andrews County, emphasizes the tremendous potentialities of deep reserves off the east side of the Central Basin platform. Together with several more recent discoveries, it indicates the possibility of major reserves for the area. The well, Magnolia 1 University, was completed in May for 556 bbl. of oil daily from perforations at 13,840-13,884 ft. North and south offsets have since been completed. The field name is a combination of Magnolia and the University of Texas.

oils in volatility characteristics and in use in heavily loaded gears, the authors note no evidence to date to show that synthetics offer any advantage over petroleum-base oils from the standpoint of engine wear. While synthetics have found use in aircraft turbine service, they are still entirely too costly for use as crankcase lubricants.

In gear lubrication for transmissions of the conventional manual shift, there is increasing interest in the low-viscosity, high-viscosity-index gear oils of both synthetic and petroleum origins. In rear axles, the continued use of gears as small as possible will result in probable higher unit loading. To meet this trend, even more effective extreme pressure lubricants will be necessary.

Preignition test . . . The knocking experienced in some modern high-compression engines is due to preignition rather than to detonation, said R. F. Winch and F. M. Mayes, of Sun Oil Co.

Without equipment which can differentiate between the two phenomena, they cannot be studied or controlled independently. Their contribution to such studies is a new technique, described in their paper "A Method for Identifying Preignition."

"Preignition, as it applies here, can be defined as the initiation of a flame front at any point in the mixture before combustion initiated by the spark plug would normally reach that point. This definition has been purposely made all-inclusive and encompasses all of those phenomena which have previously been described by such terms as surface ignition, hot-spot ignition, after firing, and wild ping. Detonation is eliminated from this definition only by the fact that detonation combustion does not conform to the conventional flame front type of combustion," said the authors.

The new method developed in the Sun Laboratory, the authors said, is:

1. Simple, easy to construct and operate, and comparatively inexpensive.

2. Applicable to single or multicylinder engines in the laboratory or on the road.

3. Easy to install with no mechanical modifications to the engine.

4. Sensitive to mild preignition, regardless of the location of the source.

5. Able to distinguish between preignition and detonation.

6. Capable of producing accurate and reproducible results.

The electrical properties of the spark-plug gap vary, depending on the times in the cycle at which combustion is initiated and completed, i.e. whether or not secondary flame fronts are present. Specifically, changes occur in the conductivity of the gap which are reflected in variations in current flow. These variations in current flow provide the basic operating principle for the Sun method.

Preignition is a problem that is going to have to be wrestled with if progress is to continue in the field of mutual adaptation of fuels and engines, conclude the authors. They trust that their new method, separately identifying preignition from detonation with simplicity, will prove valuable in developing better fuels for future high-compression engines which may be preignition-limited.

New sludging test . . . The sludge-handling ability of lubricants at low temperatures can now be measured by a new method reported by J. G. McNab, M. E. Conn, D. S. McArthur and K. L. Stehle of Esso Laboratories, Research Division, Standard Oil Development Co.

The new test measures this lube characteristic in terms of the time required to reach 30 per cent oil-screen plugging in cyclic laboratory-engine operation.

Since the manner in which the sludge builds up in this test is similar to the way it builds up in field engines, the results correlate well with those obtained in low-temperature, stop-and-go field service, reported the authors. Reproducibility of the S.O.D. method is good, they said, and it is expected to prove useful to other research groups working on the important problem of low-temperature sludge formation in gasoline engines.

TCP progress report . . . Further information on the control of spark plug deposits using the fuel additive tricresyl phosphate (TCP) was presented at the meeting by C. R. Johnson and D. N. Harris of Shell Oil Co., New York.

Their paper was in the form of a status report on tests completed and under way in military and commercial aircraft.

At the present stage in the study, they reached the tentative observation that considering all factors, the optimum TCP scavenger composition appears to be 1.0/0.1. The numbers refer to scavenger composition, the first being the theories of ethylene dibromide present and the second being the theories of TCP present assuming 2 mols of TCP combined with 3 mols of TEL to form lead phosphate.

Fuel containing 0.1 theories TCP can be used advantageously in certain equipment to reduce spark-plug fouling without adverse secondary effects. However, they concluded, until such time as a solution is found to the deposition problem, fuel containing TCP cannot be used indiscriminately in all aircraft equipped with exhaust turbos.

"TCP is effective in controlling spark-plug fouling under conditions of extreme manual leaning which is being rapidly adopted by both military and commercial operators desiring to reduce fuel consumption. The degree of relief from spark-plug fouling afforded by TCP is in proportion to the amount of difficulty being experienced," they found.

In the light of information to date on TCP's role in what has been considered normal high-power level-engine operation, the results appear to justify continued investigation, they concluded.

Award Winner Named

DETROIT.—L. F. Dumont, research engineer in the petroleum laboratory of E. I. du Pont de Nemours & Co., Inc., last week received the Horning Memorial Award of the Society of Automotive Engineers.

L. F. DUMONT

The award was for his paper, "Possible Mechanisms by Which Combustion Chamber Deposits Accumulate and Influence Knock," which was judged the "best paper relating to the adaptation of fuels to internal-combustion engines, or the adaptation of internal-combustion engines to fuels" presented at an S.A.E. meeting during 1951.

Dumont has been in the du Pont petroleum lab since 1948 and has been leader of the scavenging research group since 1950, in which he supervises engine research on combustion-chamber-deposits problems.

Treated Water Profitable

WASHINGTON.—Chemically treated water "conditioned" to the area where it is used will develop a greater oil return in water-flooding operations than untreated water, it was reported last week by the Bureau of Mines.

Summarizing the results of a 5-year study of 24 water-treating plants in the Mid-Continent, the bureau said that treated water maintains better pressure, reduces clogging in the reservoir and in other ways gives better results.

The survey included the collection of data from all 24 of the plants and detailed information on nine of them as representatives of methods followed and results secured in the Mid-Continent field. The study was carried out in cooperation with the Kansas State Board of Health, the State of Oklahoma, and the North Texas Oil and Gas Association.

Results of the work are discussed in Report of Investigations 4930, copies of which may be secured without cost from the publication distribution section of the Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.

Resources Enigma

Aramco vice president says nations must reach agreements to relieve serious problem posed by oversupply of crude

DALLAS.—The next decade will see the gradual evolution of means for coping with the paradox arising out of the marketing rivalries of different states producing oil and other minerals, James Terry Duce, vice president of Arabian American Oil Co., said this week in a speech in Dallas.

J. T. DUCE

The problem, Duce said, is a grave one. To be of use to the government of a producing country, the oil must be sold. However, the supply is large, and the market is limited.

Duce said he believed the rivalries resulting from such a situation must be settled by agreements in which local requirements are adjusted to the economics of the much greater international field. Over the next 10 years, he said, "we will see set up within the world plans to deal constructively with these problems." They will result, he said, from carefully worked-out agreements between producers and governments.

The Aramco official spoke before the Dallas Council on World Affairs. He described some of the political problems affecting the international petroleum industry and discussed the responsibilities of governments producing commodities moving in world trade.

World responsibility . . . "Governments within whose borders these commodities are produced, when they assume the cloak of nationalism, assume at the same time the obligation not to interfere with this flow of mineral products, but to encourage and to nurture it," Duce said. "They cannot escape that responsibility. The responsibilities indeed I think are reciprocal. It is the world's responsibility that the producing nation receive just compensation for its contribution to the world community.

"The production of a commodity in a single country for use within that country is the particular problem of that country. When, however, a commodity moves into international trade, it becomes a problem also for the international community. This is a factor that most proposals to nationalize industries fail to recognize for in a way it is the intrusion of one government into the sphere of another."

Duce commented that, unlike representatives of Russia who are by definition agents of that Communist government when engaged in world trade, the commercial organizations of the western world are primarily interested in the distribution of products to the people of the world.

Second guessing . . . "I am merely hazarding a guess that the situation in Iran might have never developed so critically had the British Government not been owner of a majority of the stock of the Anglo-Iranian Oil Co.," he said. "From what I know, the British Government did not interfere in any way in the affairs of the company, but the Iranian suspicions remained just the same."

On the international scene, at the present time, the tin and oil industries face grave problems, Duce said. They are not commercial problems but political ones.

"Particularly in Iran and in Bolivia, the local people see in the oil and the tin the things they so badly need," he said. "The political leader says to his people: 'If I can gain control of these resources, I can with the wealth from these do innumerable things for you.'

"He may believe his own words, for

Deep Rock Installs Continuous Lube-Blending Facilities

Continuous and automatic blending of lube oils is provided in the recently expanded blending and packaging plant of Deep Rock Oil Corp. at Cushing, Okla. Here an operator manipulates valves to obtain the correct compounding of various oils and additives. The valves control 12 tanks of different weights of oil and three tanks of additives, all installed overhead. Expansion of the blending plant is the first step in a multimillion-dollar modernization program planned by Deep Rock for its lube-oil manufacturing facilities, which produce 150 different lubes. The design and construction work was handled by the Chemical Plants division of Blaw-Knox Construction Co.

the arithmetic upon which he bases his proposals is so simple, yet so deceptive. He forgets the fact that while the mineral is produced inside his state, the markets for it are outside, and the one without the other is of no use at all."

Kansas Reports New Records

WICHITA. — Kansas oil operators set new all-time records last year for both drilling and production, according to the Kansas Corporation Commission.

Production totaled more than 114,000,000 bbl. — almost 100,000 bbl. more than the 1951 total of 113,912,366 bbl.

Completions totaled 4,272, with 2,115 new oil producers, 307 gassers, and 1,940 dry holes. Operators drilled 965 wildcats and completed 109 of them as oil producers, 14 as gassers. The Kansas body does not list as wildcats those wells discovering new producing horizons in old fields.

The record production last year, the commission said, was from more than 29,000 wells of which 23,600 were unprorated.

Microwave Milestone

Transcontinental formally accepts 1,840-mile system from General Electric; seven channels will be used initially

WASHINGTON.—Completion of the world's longest system of microwave radio communications was celebrated here January 9, when Dr. W. R. G. Baker, vice president of General Electric Co., presented a "master key" to Claude A. Williams, president of the Transcontinental Gas Pipe Line Corp., to "unlock" the communications system along the 1,840-mile pipe line from Texas to New Jersey.

The $1,500,000 system passed its final engineering tests last month. It is capable of providing the equivalent of 12 channels by a chain of 59 microwave stations which relay extremely high-frequency signals from one to another along the pipe line.

Only 7 of the 12 channels will be used initially, providing radio telephone facilities necessary for operation and maintenance of the line, such as the hourly reporting of gas pressures from all compressor stations to the Houston office, and the control of gas flow by the dispatcher in Houston.

The remaining channels may be utilized later for additional voice communications or for carrying signals to control motors, read meters, open and close valves and perform other similar tasks.

Two "party line" channels extend the entire length of the line. The other channels now in use provide a number of "private lines" between the main office in Houston and key district offices along its route. Communicating facilities are provided at 23 of the microwave stations, the remaining 36 being automatic repeaters with no provision for communicating other than for servicing.

Communicating stations are located at either end of the network, at two division offices and at all 19 compressor stations. Three "spurs" from the main system connect three other division offices with the main office and other points in the system. There are 58 towers, ranging from 50 to 300 ft. in height, placed at an average of about 30 miles apart. The main system operates at 2,000,000 kc., while the spurs operate at 960,000 kc.

Claude A. Williams, right, president of Transcontinental Gas Pipe Line Corp., receives a gold key to his company's new microwave system from Dr. W. R. G. Baker, vice president of General Electric Co., which engineered and built the system.

Scurry Decision Expected

AUSTIN. — Final decision is expected this week by the Texas Railroad Commission on the application of a large number of operators to unitize the Canyon Reef pool of Kelly-Snyder and a portion of Diamond M fields in Scurry County, Texas.

Final arguments were heard January 12 by the commission and there were indications a decision would be announced this week.

Attorneys opposing the unitization program contended the unit plan is contrary to the aims of conservation, is confiscatory, and basically is an attempt to get commission approval in advance of an antitrust violation. The basis of participation also was attacked as unfair.

If the plan is approved, the unitization program is expected to be put into operation immediately. Preliminary field work for water flooding the reservoir already has been finished. The project, if conducted, will be the world's biggest unit operation.

Some I.P.E. Space Available

There is still 20,000 sq. ft. of outside exhibition space available to manufacturing or service firms wishing to participate in this year's International Petroleum Exposition, William B. Way, general manager, announced last week.

This space is available only because two new areas have been added for the 1953 show, Way said. Of these, the west area has been sold out and most of the north area already is gone, he said. *(For a sketch of the exposition grounds showing the new areas, see The Oil and Gas Journal, November 17, page 247.)*

The new west area contains 2 acres of exhibit space and the north area 4 acres. Way said the remaining space in the north area would be allocated to suit exhibitors' requirements.

Dollarhide Formula Adopted

AUSTIN.—Texas and New Mexico conservation bodies, after months of negotiation, finally have settled on a common proration formula for the two-state Dollarhide oil reservoirs.

The allowable production for both states will be 91 bbl. daily in Dollarhide Clearfork (Drinkard) and 100 bbl. daily in Dollarhide Devonian pool.

The New Mexico Oil Conservation Commission agreed to accept these allowables which have been in effect previously in Texas. In the New Mexico portions of the fields wells are now allowed to produce 80 and 135 bbl. daily, respectively.

The Texas Railroad Commission, in return, agreed to permit daily production instead of on a limited number of days each month. The new schedule will go into effect February 1.

MIDDLE EAST

British Win Aden Case

Judge's decision turns on failure of Iran to pay proper compensation for nationalized properties; appeal slated

Dahl M. Duff

THE Anglo-Iranian Oil Co., Ltd.'s claim to any oil exported from its former Iranian properties until adequate compensation is offered has been upheld by the Supreme Court of the British crown colony of Aden.

The importance of the decision was in the fact that it was the first legal ruling in the company's announced plan to file suit wherever possible to establish its legal ownership to production from the nationalized facilities.

The outward effect of the ruling in Aden was to turn over to the company about 5,900 bbl. of crude oil which was lifted last June by Swiss and Italian interests in the small tanker, Rose Mary. The vessel's cargo is the only oil moved from Iran since the Iranian industry was closed down about 1½ years ago.

Appeal indicated . . . The oil carried by the Rose Mary was valued at about $14,000. The group which made the shipment indicated they would appeal. Next step will be to carry the case to the East African Court of Appeals or to the Privy Council in London. When the appeal is taken, Anglo-Iranian will put up the amount of the value of the oil with the court.

The Rose Mary became the object of international attention last June after it took on the cargo. For several days, the vessel was unreported. Then, when it put in at Aden at the southwestern corner of the Arabian Peninsula, Anglo-Iranian filed injunction proceedings on grounds that the oil was its legal property.

The tanker had been chartered by Bubenberg Co., a Swiss firm, to lift Iranian oil under an arrangement made by the Italian company, Ente Petrolifero Italia Medioriente (EPIM). During the hearing of the suit, Anglo-Iranian's attorney called the Italian Count Della Zonca, head of EPIM, a "petrol runner who bought stolen goods cheap." The Rose Mary is owned by the Cia. de Navegacion Tersita, registered in Panama.

Compensation the key . . . The decision in the Rose Mary case was delivered by Judge Ralph Campbell. He ruled that oil from the concession was legally the company's property, despite nationalization, since the Iranian Government has not offered adequate payment to the company. He said the court "must refuse validity to the Iranian oil nationalization law insofar as it relates to the nationalized property of the plaintiffs" (Anglo-Iranian).

Under international law, there cannot be expropriation without compensation, the judge said. Otherwise such action constitutes confiscation. Judge Campbell based his decision on other judgments by courts of civilized nations. He discussed the legal steps taken after the nationalization of the oil industry in Mexico in 1938 and pointed out that the Mexican Government recognized the principle of adequate compensation.

The judge recognized that it was generally established that British courts would not question the validity of legislation of foreign sovereign states. However, he indicated that the principle of compensation was an overriding consideration.

Coercion alleged . . . Another issue that arose in the case was whether, as attorneys for the charterers of the Rose Mary claimed, the captain of the vessel had been frightened by Royal Air Force planes into putting his ship in at the British port. The judge rejected the captain's testimony to this effect and found that he had simply followed instructions from the ship's owners in entering Aden. He said no reasonable men would think it likely that the British Government in 1952 would try to resolve a commercial dispute by what would be little short of an act of war.

The decision of the Aden court obviously is not binding on courts outside British jurisdiction. However, it establishes an important precedent which, if not upset on appeal, would affect any similar cases arising in British-controlled areas throughout the world.

Talks continue . . . Meanwhile, the high

Cracker Model Flies to India

This Canadian-built model has been sent to Bombay, India, to assist in the planning of the new Burmah-Shell refinery. The model is of the 12,500-bbl. fluid catalytic cracking unit at the Montreal East refinery of Shell Oil Co. of Canada, Ltd. A duplicate unit is to be built at Bombay, and the decision to ship the model by air to India was taken after a group of engineers visited the Montreal plant to study the refinery's facilities. The model is shown here as it was exhibited at a Petroleum Industries show in Montreal. The towers in front comprise the light-ends plant; the catalytic cracking unit is to the rear. The new refinery which Burmah-Shell Refineries, Ltd., is building at Bombay will have a crude charge capacity of about 40,000 bbl. daily.

diplomatic discussions aimed at obtaining an over-all settlement of the British-Iranian oil dispute continued in the utmost secrecy. Iranian Prime Minister Mossadegh held further conferences with U. S. Ambassador Loy W. Henderson. Dr. Mossadegh also met at length with the Shah and presumably discussed the progress of the new negotiations, which were initiated by the outgoing Democratic administration in Washington.

Henderson has been meeting with Mossadegh since he returned to Teheran late in December. Other meetings are taking place between British and American diplomats and government officials in London. The State Department is said to be keeping the British Government fully informed on the results of the Henderson-Mossadegh talks.

It is now anticipated that the latest settlement effort will reach a climax in the near future. Opinions differed as to whether the Iranian prime minister would be able to weather the internal opposition a settlement is certain to provoke. The Communists and the fanatically nationalistic elements in Iran could be expected to create an uproar against any agreement, regardless of how favorable to Iran.

A Teheran newspaper close to the government reported that Henderson and the prime minister were discussing the purchase of 10,000,000 tons, or about 75,000,000 bbl., of Iranian oil which would be used for the North Atlantic Treaty forces in the Middle East and the Mediterranean. It said the points at issue were the price to be paid, the companies that would buy it, and the question of compensating Anglo-Iranian for its properties.

New Shipment Expected

A new attempt to lift oil from the nationalized properties of Anglo-Iranian Oil Co., Ltd., in Iran was reported in the making last week.

The 7,000-ton tanker Mirella was in the Red Sea headed for Abadan, presumably to load either crude or products, despite British warnings that suits will be filed against Iranian oil exporters.

The ship is owned by Transporti Maritimi, Genoa, and was reported under charter to the Italian Cia. Petrolifera Italiana. Rome newspaper reports that the Caltex organization was connected with the ship's movements were flatly denied by the company in New York. The Mirella's voyage was believed to be another small-scale attempt at Iranian oil export by an unaffiliated promoter in Italy.

Loading Record Set

Iraq Petroleum Co., Ltd.'s shipments from its tanker terminal at Banias, Syria, reached a record in December when 1,146,408 tons, or an average of 280,000 bbl. daily, were exported. It compares with Banias shipments of 985,395 tons, or about 250,000 bbl. daily, in November.

Banias is the terminal of the new 30 and 32-in. pipe line which was opened from Kirkuk field last spring. Other I.P.C. exports are made through the old 12 and 16-in. system from Tripoli, Lebanan. In November, Tripoli shipments totaled 675,313 tons, or about 172,000 bbl. daily.

EUROPE

Schoonebeek Slump

Output of western Europe's biggest field due to fall off

A GRADUALLY declining production is foreseen for the single Schoonebeek field in the Netherlands, but work is now under way to utilize the natural gas which has been discovered at several other points in the eastern part of the country.

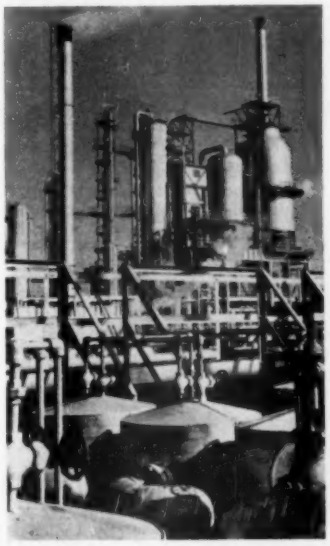
A statement issued by the Dutch Minister for Economic Affairs in Amsterdam said the normal rate of crude production will be maintained through 1953 and 1954 and that after 1954 it is estimated output will decrease by about 400 to 800 bbl. daily per year.

Schoonebeek, located on the German border, has a production stabilized at about 14,000 bbl. daily and is the largest producing field in Western Europe. It was discovered in May 1943, but the development came during the immediate postwar years. The field now has about 163 wells producing 25°-gravity crude from around 2,500 ft.

The operating company is N. V. Nederlandse Aardolie Mij., owned 50-50 by Standard Oil Co. (N. J.) and Royal Dutch-Shell. Since the end of the war, N.A.M. has done extensive exploratory drilling elsewhere in the Netherlands. This program has failed to extend the crude output, but potential natural-gas production has been developed.

A recent report from the Netherlands said a pipe-line system is being laid in the eastern part of the country which, on completion, will extend between about 250 and 370 miles.

Another recent development was the action of N.A.M. in applying to the provincial Government of Groningen Province for a concession over an area of nearly 7,000 acres in the vicinity of Winschoten, near the German border and about 30 miles north of the Schoonebeek area. This followed the discovery of anhydrite and rock salt in commercial quantities.



Cracking Capacity Climbs

This is a view of the newly commissioned 10,000-bbl. fluid catalytic cracking unit at the Llandarcy, Wales, refinery of Anglo-Iranian Oil Co., Ltd. The refinery has a capacity of more than 80,000 bbl. daily and ranks as one of the largest in the United Kingdom. When a similar unit is finished later this year at Anglo-Iranian's new Kent refinery, total catalytic cracking capacity in the United Kingdom will amount to about 96,000 bbl. daily in five plants—all built in the last few years.

Offering Oversubscribed

The $56,000,000 offering of debenture stock by Anglo-Iranian Oil Co., Ltd., was heavily oversubscribed when it was first placed on the market in London.

The issue represented the first time that the company has gone to the public for money in nearly 30 years *(The Oil and Gas Journal, January 12, page 74)*. The funds were needed in view of the stepped-up expansion undertaken by Anglo-Iranian since the loss of its properties in Iran.

Unlike other new security issues offered by British companies in recent

months that have met with a generally sluggish reception, purchase applications for the Anglo-Iranian issue exceeded the amount to be offered by 12 times. Allocation of the issue was made to favor small investors. The applications of large institutions totaled more than $70,000,000, but under the allocations, they will receive only 2 per cent of solicited amounts.

The highly favorable reception of the issue was interpreted in London as showing the public's confidence in the company's future, despite the nationalization of the important Iranian assets.

The total amount of the debenture stock issue made up only slightly more than a quarter of the company's projected 1953 expenditures of $210,000,000. They will be financed mainly from the company's own resources and retained profits.

Refinery Nearly Finished

The new Esso refinery now nearing completion in Antwerp at a cost of some $25,000,000 is expected to come into operation in April, according to a recent report from Belgium.

The refinery will produce a full line of major products with a throughput capacity of 1,200,000 tons a year, or about 24,000 bbl. daily. (A full description of this refinery appears on page 115 of this issue). The operating company is Esso Standard Refinery S.A.

Standard Oil Co. (N. J.) subscribed almost all the entire capital of about $6,000,000 for the Belgian-incorporated operating company and made major loans for the project. In addition, the Belgian Government made available the equivalent of about $18,000,000 through the National Company for Industrial Credit.

The new refinery will serve the Esso marketing organization in the Benelux area and will end the former dependence of these affiliates on outside sources of supply. The Esso project is the second major postwar refinery to be built in Belgium. About a year ago, the new 50-50 Petrofina-Anglo-Iranian Oil Co., Ltd., refinery was completed near the site of the Jersey plant about 5 miles downstream from Antwerp on the Scheldt River. This refinery now processes about 40,000 bbl. daily, and construction of a catalytic cracking unit with a capacity of about 20,000 bbl. daily is under consideration.

SOUTH PACIFIC

Technicians Arrive

Key construction men have arrived in Australia from the United States to begin work on the enlarged 22,000-bbl. refinery of Vacuum Oil Co., Pty., Ltd., at Altona, Victoria.

J. O'Neil, of the C. F. Braun Co., Alhambra, Calif., which has the contract for the project, arrived in Sydney in mid-December. Actual construction was scheduled to start in January. About 1,500 Australian workers will be engaged on the job, along with some 60 American engineers and technicians.

Vacuum Oil, a subsidiary of Standard-Vacuum Oil Co., now has an 1,800-bbl. plant, mainly for lubricating oil at Altona. The new refinery will include catalytic cracking and reformer facilities and will produce a full line of major products.

Gasoline Upgrading Slated

A higher-octane gasoline is expected to be introduced on the Australian market this year.

C. A. Gregory, executive director of the Service Stations Association of Australia, said recently in Melbourne that the gasoline probably will have an octane of about 84 as compared with 72 at present.

Other industry officials said the oil companies were likely to market only the new grade in order to avoid costly duplication of storage and pump facilities.

Four major refineries with a total capacity of about 125,000 bbl. daily are scheduled to be completed in Australia during the next 2 or 3 years, one each by Anglo-Iranian Oil Co., Ltd., Caltex, Standard-Vacuum Oil Co., and Shell.

Philippine Completion Set

The new 13,000-bbl. refinery being built in the Philippines by Caltex is expected to go into operation late next year, according to an announcement in Manila.

The plant will cost 60,000,000 pesos (about $30,000,000) and will be the first in the republic. Since there is no indigenous production, Caltex is expected to import crude for the operation from central Sumatra, where it opened Minas field last spring. The operating company in the Philippines is Caltex (Philippines) Inc.

World Briefs

Arabian American Oil Co. has contracted with American Development Co. for the installation of three electrolytic caustic regeneration units which will operate in conjunction with a new 25,000-bbl. per day light straightrun gasoline treater to be built at the Ras Tanura refinery.

More than 25,000 bbl. of crude oil and products, including gasoline, were destroyed January 10 when a fire swept through a Yacimientos Petroliferos Fiscales tank farm at Eva Peron, Argentina. Twenty firemen were injured fighting the blaze.

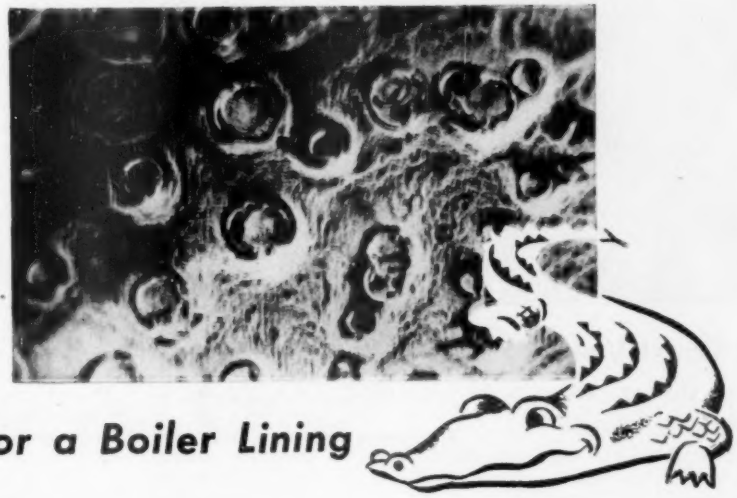
A new 18-minute featurette film, titled "Out of the Earth" and dealing with oil operations in Saudi Arabia has been produced by Universal-International. It was made with the cooperation of Arabian American Oil Co. and the Saudi Arabian Government and will be seen by an estimated 25,000,000 persons in movie theaters throughout the country.

A new company has been organized in Colombia for the production of fertilizers from natural gas from the government's fields in the former De Mares concession. The project is being promoted by the official National Institute of Industrial Development, the Farm Mining and Industrial Loan Corp., the National Federation of Coffee Planters, and the government oil company which has controlled the fields since the concession term of Tropical Oil Co. expired in August 1951.

Venezuela's first sulfuric-acid plant designed to serve oil and mining companies and other industries is expected to go into production in April. It is being built by Manufacturas de Algodon INCA, C.A., at Maracay and will have an initial daily output of 15 metric tons. The plant will use 150 long tons of crude sulfur monthly. No sulfur is now mined from domestic sources, though development of Venezuelan deposits is expected to be started this year by United States capital.

A new oil-producing area has been discovered at Tangshan, about 100 miles southeast of Peking in north China, according to the semiofficial Communist China news service. It said the discovery had been confirmed by the Petroleum Control Bureau of the Chinese Ministry of Fuel.

Alligator Hide



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West Coast Veep

Swayze started out to become a metallurgist

R. O. SWAYZE, who recently assumed duties as vice president and director of production of General Petroleum Corp., Los Angeles, originally planned to become a metallurgical engineer.

However, a slump in the mining industry following his graduation from Missouri School of Mines caused him to take a "temporary" job as accountant in General Petroleum's production office at Taft, Calif. A year later he was named assistant geologist for the San Joaquin Valley area.

A succession of geological and production engineering assignments followed. He was appointed assistant manager of the geological department in 1935.

In 1945 he joined the production department as assistant manager for the Rocky Mountain area. Two years later he returned to become manager of California operations for the production department, a post he held until becoming vice president.

Swayze's principal outside interest is in the history of the exploration of the West and the tribes, customs, and languages of western Indians. A native of Kansas, he now makes his home in San Marino, Calif.

He is a member of the American Association of Petroleum Geologists, the American Institute of Mining and Metallurgical Engineers, and other national engineering fraternities.

Sam N. Webb, formerly a geologist for Honolulu Oil Corp. at Jackson, Miss., has joined Kirby Petroleum Co. at Houston.

J. B. Jenkins has been named superintendent of Stanolind Oil & Gas Co.'s Abilene (Tex.) district. Jenkins, former district engineer in Abilene, succeeds **G. C. Wight,** who has been transferred to Houston as assistant division production superintendent of the Texas-Louisiana Gulf Coast division.

G. S. Hanna, British American Oil Co. official who has been on loan to the oil division of Canada's Defense Production Department since it was set up more than a year ago, has been named oil administrator. He succeeds **Dr. D. M. Morrison,** Shell Oil Co. of Canada, Ltd., who will take over an appointment in his company's Toronto offices. Hanna formerly was manager of British American's product and crude-oil procurement department.

A. L. Lyman, director of laboratories for California Research Corp. since 1946, has been elected to the newly

A. L. LYMAN

BATCHELDER

created position of executive vice president. **A. H. Batchelder,** assistant director of laboratories at Richmond, Calif., has been elected a vice president and director. Batchelder also will be general manager of the Richmond laboratories.

Franklin T. Bethel, formerly a research associate at Pennsylvania State College, has been appointed a junior exploitation engineer for Shell Oil Co. at Hobbs, N. M.

William A. Vestal, formerly a reservoir engineer for Phillips Petroleum Co. at Bartlesville, Okla., has been appointed district engineer for Lion Oil Co. at Snyder, Tex.

L. G. May, formerly assistant to the chief of the exploitation and engineering branch of Gulf Oil Corp., Pittsburgh, has been named acting chief of the branch. His primary function will be to act as an adviser to the vice president of the production department on drilling, production, and engineering matters.

Merle L. Hall, formerly a district petroleum engineer for Texas Petroleum Co. at Maracaibo, Venezuela, has been named a reserves engineer for Phillips Petroleum Co. at Bartlesville, Okla.

William P. Gage has resigned as vice president in charge of manufacturing for Shell Chemical Corp., New York, to become president and a director of Grace Chemical Co., a wholly owned subsidiary of W. R. Grace & Co.

Avery E. Smith, geologist for Sun Oil Co. at Morganfield, Ky., has been transferred to Evansville, Ind., as a water-flood geological engineer.

C. J. Christensen, district superintendent for Stanolind Oil & Gas Co. at Shreveport, has been appointed district superintendent at Lubbock, Tex. He replaces **M. M. Montgomery,** who has resigned.

W. K. Ghauri, engineering trainee for Shell Oil Co., has been transferred from Los Angeles to Ventura, Calif.

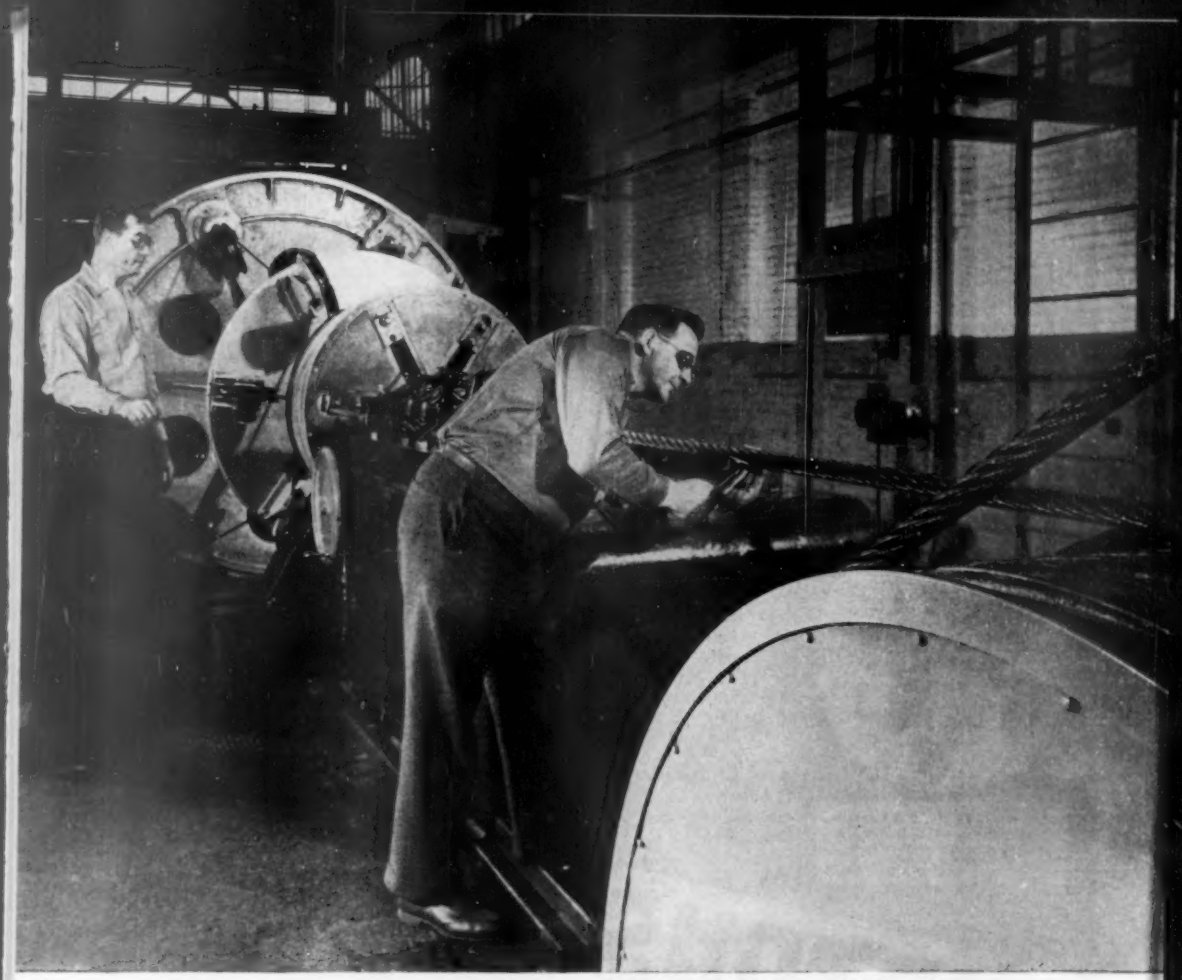
J. W. Wilson, production superintendent in Mississippi for Three States Natural Gas Co., has been transferred to Price, Utah.

Charles P. Baker has been appointed vice chairman of the manufacturing committee of Socony-Vacuum Oil Co., Inc. He succeeds **George S. Dunham,** who recently was elected to the company's board of directors.

Charles E. Teacle, production engineer for Pure Oil Co., has been transferred from Houston to Morgan City, La.

Charles V. Campbell, geologist for Phillips Petroleum Co., has been transferred from Caracas, Venezuela, to Thermopolis, Wyo.

W. J. Coppinger has organized Coppinger Drilling, Inc., in Wichita. **Howard A. Stoskopf,** vice president, will



Here a big wire rope emerges from Bethlehem's 66-in. closing machine. At this stage of the checking, the inspector is making sure that the diameter is within specified tolerances.

He seldom has to say "No"

Saying "no" can be part of the Bethlehem rope inspector's job. Fortunately, he seldom has to use the veto power, for Bethlehem rope is made with such care that rejects are few. But the inspector won't hesitate to stop a rope if even a minor detail is subject to question.

This is merely common sense. But it's also something more. It's the best possible protection for the buyer. It means that the dollars you spend for Bethlehem wire rope will buy what you pay for—a product that meets the highest standards of workmanship.

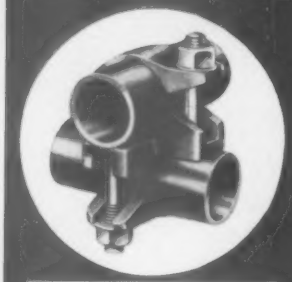
In the making of this product, nothing is left to chance. That's one of the reasons why Bethlehem rope is dependable rope . . . the kind that will serve you well in the toughest sort of going.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

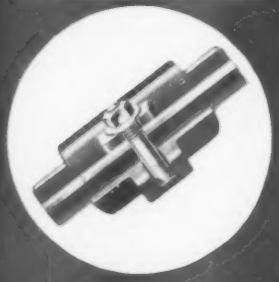
for SPEED and STRENGTH in OILFIELD CONSTRUCTION



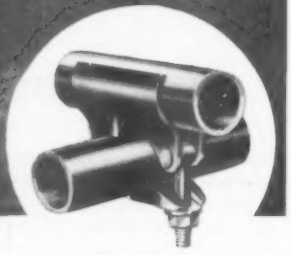
BURTON'S PATENT DOUBLE COUPLER
(For coupling upright tubes to horizontal tubes) R.D. 823,801
PAT. Nos. 507,411 & 602,055

BURTON'S PATENT SWIVEL COUPLER
(For coupling bracing tubes to strengthen scaffold)
PAT. No. 507,411

BURTON'S PATENT COMBINED JOINT PIN AND COUPLER
(For joining two tubes end to end)



BURTON'S
PATENT
DOUBLE-GRIP
DROP-FORGED
STEEL SCAFFOLDING
FITTINGS



Pat. No. 423,151
BURTON'S PATENT PUTLOG COUPLER
(For fixing Putlogs or transoms to horizontal tubes)

60 FT. TOWER SUPPORTING 12 TONS. ERECTED BY

LONDON & MIDLAND STEEL SCAFFOLDING CO. LTD.
CLIVEDEN WORKS, OLD HILL, STAFFORDSHIRE, ENGLAND

PERSONALS

serve as land man. Other officers are: **Henry D. Ficken,** secretary and treasurer; **O. E. Owens,** director; **Neal Cramer,** director; and **A. J. Carter, Jr.,** director.

Dr. Paul Giddens, curator of the Drake Museum, Titusville, Pa., has been elected president of Hamline University of St. Paul, Minn., effective March 1. Dr. Giddens has been head of the department of history and political science at Allegheny College, Meadville, Pa., since 1931. He was appointed curator of the museum in 1943. He is the author of several books and pamphlets concerned with the oil industry.

Russell Farmer has joined the oil department of United States Smelting, Refining & Mining Co. as assistant to the general manager of oil operations. He will continue to live in Fort Worth.

NORTHINGTON

K. V. Northington, Jr., has joined Thomas D. Humphrey & Sons, Dallas, and their affiliate, Ace Drilling Co., as field geologist in Abilene, Tex. Northington is a graduate of the University of Texas and formerly was with Abilene Sample Log Service. **Bill J. Burton,** a graduate of Texas Technological College, has been appointed a geologist in the Dallas office.

D. G. Stookey, The Texas Co., has been elected president of the Fort Worth Geological Society for 1953. Other new officers include: **M. D. Mauck,** Pure Oil Co., first vice president; **J. D. Kennedy,** J. C. Maxwell, Inc., second vice president; **Kenneth W. Germond,** Southern Production Co., Inc., secretary; and **Ray Claiborne,** consultant, treasurer.

Jay E. Crane, vice president of Standard Oil Co. (N. J.), New York, has been appointed a Class C director of the Federal Reserve Bank of New York for the unexpired portion of the 3-year term ending next December 31, and has been designated as chairman and federal reserves agent at the bank for the remainder of 1953. From 1915 to 1935, Crane was employed by the bank and since January 1, 1949, has been serving as a Class B director.

At Independents' Meeting in Houston

Seated at the head table at the recent district meeting of independent oil operators in Houston were, left to right: Paul Barnhart, Houston independent; Russell B. Brown, general counsel of the Independent Petroleum Association of America and principal speaker at the meeting; Harold Decker, president of Houston Oil Co.; Charlton H. Lyons, I.P.A.A. president and Shreveport independent; and J. R. Butler, Houston independent.

Lowell Pearson, independent, has moved his office from Casper, Wyo., to Denver.

Thompson Reid, formerly an engineer for Sohio Petroleum Co. at Owensboro, Ky., has been appointed a petroleum engineer for Barger Engineering at Evansville, Ind.

H. V. Risien, formerly an engineer for Crown Central Petroleum Corp. at Houston, has been appointed field superintendent for Clayton N. Smith at Monahans, Tex.

Dr. Frank M. Siebert, assistant to the vice president of Gulf Oil Corp. and for many years chief chemist for the production division at Houston, has retired. He joined Gulf in 1917.

C. C. LISTER

C. C. Lister, vice president in charge of operations for United Geophysical Co., has been elected president. He joined United in 1937 and was a member of the company's first party to Trinidad. He worked in Brazil and Colombia and later was appointed manager in Venezuela and manager of foreign operations at Pasadena, Calif. **R. G. Sohlberg,** formerly manager of Canadian operations, has been transferred to Pasadena as vice president of operations. **S. O. Patterson,** formerly assistant manager in Canada, has been named to succeed Sohlberg.

R. R. Turner, production foreman for Stanolind Oil & Gas Co. in the Elk basin area of Wyoming, has been promoted to field superintendent in the Salt Creek area of that state. He replaces **W. A. Van Hook, Jr.,** who has been transferred to Shreveport as district superintendent.

G. L. Campbell has resigned from Ginther-Warren-Ginther, independent producing firm, to do geological consulting work at Sterling, Colo.

John J. Jacob, Jr., has been elected executive vice president of Peoples Natural Gas Co. He began his career with the firm in 1922 and became a director in 1938, executive assistant to the president in 1939, and vice president and assistant manager of Peoples and New York State Natural Gas Corp. in October 1942. He was president of the Natural Gas Men's Association of Western Pennsylvania in 1951.

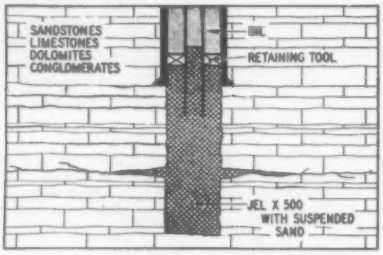
Ray M. Evans, president of Evans Lead Co., Charleston, W. Va., and **William B. Anderson,** president of Anderson-Newcomb Co., Huntington, W. Va., have been elected to the board of directors of Columbia Gas Systems, Inc.

Joe T. Dickerson, vice president and area manager of Shell Oil Co., has been elected president of the Midland, Tex., Chamber of Commerce.

Fenton H. Finn has been elected president of New York State Natural Gas Corp., a firm which wholesales gas to 21 major gas distributing companies in Pennsylvania and New York. He previously was vice president of

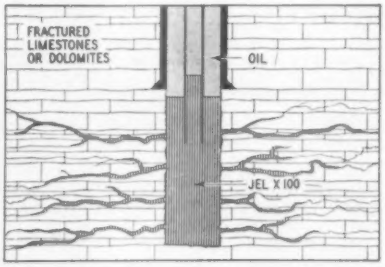
INCREASED OIL AND

Here are the Dowell Services using Jel X materials:



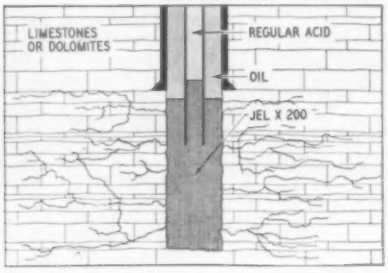
STRATAFRAC

This fracturing service using Jel X 500 has proved effective in limestone, dolomite, sandstone, and conglomerate formations. Stratafrac treatments are designed to dissolve soluble materials including silicates, paraffins and other heavy hydrocarbons and to open new fractures or extend old ones. They carry suspended sand into existing fractures as an abrading and propping agent. No jel-breaker solution is needed following a Stratafrac treatment.



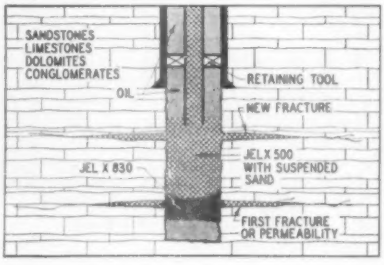
ETCHING ACID

This service utilizes Jel X 100 to permit greater penetration by the acid before it becomes spent. In formations normally requiring large amounts of regular acid, Etching Acid treatments have achieved comparable results with much less acid. They are designed to etch and enlarge "vugs", clean fractures by removing mud, silicate and feldspar materials, permitting better drainage.



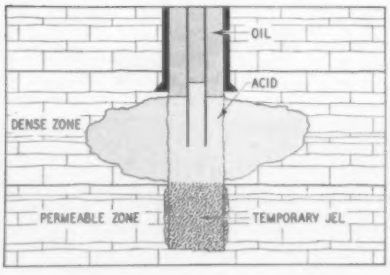
CHANNELING ACID

Channeling Acid Service uses Jel X 200 to form channels deep into pay formations. The acid in this case is mechanically diverted into a relatively few pores. This permits entrance of acid into zones far from the well bore, reaching production which might otherwise remain untapped. Channeling Acid treatments have proved particularly effective in retreating old wells.



FIXAFRAC

Fixafrac is a new temporary plugging service using Jel X 830. It is designed for use between stages of Dowell fracturing treatments to divert treating fluids into different sections. Jel X 830 carries suspended solids which react after treatment causing the material to liquefy and flow back freely to the well bore. No jel-breaker solution is needed following the treatment.



TEMPORARY PLUGGING SERVICES

These services utilize very viscous solutions (Jel X 700, 800, 820 and 900) which have proved effective in selective acidizing. They are designed to shut off the more permeable zones, permitting acid to be injected into tighter formations. Where increased plugging action is desired, the Jel X solutions can be prepared with suspended filler material. Temporary Plugging Services are particularly useful in wells having multiple zone completions.

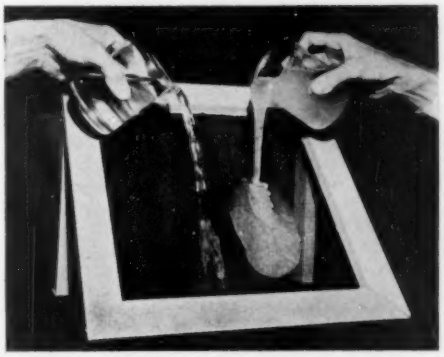
GAS PRODUCTION WITH DOWELL JEL X

Dowell Offers You Newest Improvements in Chemical-Mechanical Treatments to Improve Oil and Gas Production

Results in many fields show that Dowell Services using Jel X materials have improved the producing characteristics of all types of formations.

These services operate both mechanically and chemically, and may provide fracturing, acidizing or a combination of both in a single treatment. Results of Dowell Services and treatments have shown excellent production increases in formations that previously had proved to be unresponsive to regular acidizing.

A big, worthwhile advantage of the Dowell Services that use Jel X is the speed of treatments. Non-productive rig-time is held to a minimum with treatments often requiring as little as a few hours time. What is more, the Dowell Service method largely eliminates time-consuming mixing of chemicals on location. And it makes costly shut-in time after treatment unnecessary.



JEL X material in beaker at right is too thick to pass through ordinary window screen. After several hours it thins to free-flowing liquid at the left.

FREE, FACT-FILLED LITERATURE

Your nearest Dowell station can give you complete details on these important new well treating services. Or drop us a letter in Tulsa to Dept. A-11 for the latest literature.

DOWELL SERVICE

Acidizing • Jel X* • Electric Pilot • Perfo Jet
Paraffin Solvents • Jelflake* • Bulk Inhibited Acid
Chemical Cleaning for Heat Exchange Equipment.

DOWELL INCORPORATED • TULSA 1, OKLAHOMA
A Subsidiary of The Dow Chemical Company
"First in Oilfield Acidizing . . . Since 1932"

*Service Mark.

Look to DOWELL
FOR OIL INDUSTRY CHEMICAL SERVICE

PERSONALS

New York State Natural and system geologist for all Consolidated Natural Gas Co. subsidiaries.

Leslie H. Taylor has been promoted to district superintendent of compressor stations for Lone Star Gas Co. at Ranger, Tex. He succeeds **Sam M. Gamble,** retired.

J. S. Eads, petroleum engineer for Superior Oil Co., has been transferred from Houston to Evansville, Ind., where he will be in charge of waterflood operations.

J. S. Leonard, drilling superintendent for the past 3 years for Ohio Oil Co. at Midland, Tex., has been transferred to Sidney, Neb., as district manager. He has been with the company 23 years.

B. W. Vinson, a copartner of National Associated Petroleum Co. and managing partner of Exploration Drilling Co., Tulsa, has been elected to the board of directors of the First National Bank & Trust Co. there.

Dr. Frank M. Siebert, assistant to the vice president and for many years chief chemist for Gulf Oil Corp. in its production division at Houston, has retired from the company.

Stanley F. Davis, Jr., has been appointed manufacturing engineer for Texas Gas Corp. at Houston. He formerly was in the manufacturing-engineering division of Phillips Petroleum Co.

W. M. Manley, assistant superintendent at General Petroleum Corp.'s Torrance, Calif., refinery since 1945, and **Lloyd H. Mathews,** electrical superintendent at the company's Vernon, Calif., refinery, have retired. Manley has been with General Petroleum since 1913 and Mathews since 1919.

Robert G. Parker, formerly assistant production manager of the southwestern region of Continental Oil Co. at Forth Worth, has been named production manager for the central region at Oklahoma City. His territory will include Oklahoma, Kansas, Missouri, Illinois, Indiana, Kentucky, and parts of Arkansas and Nebraska. He is a graduate of the California Institute of Technology.

DEATHS

Dean Edward Foster, 69, who retired from Bethlehem Supply in 1947, died January 11 in Tulsa. From 1919 to 1933 he was a consulting engineer in the design, construction, operation, and management of gasoline plants, refineries and crude-oil pumping stations. He was builder and owner of the Deer Creek gasoline plant and served Bethlehem 19 years as assistant chief engineer and as head of the material department and priorities. At the time of his death he was Tulsa's street commissioner.

Ora C. Day, 60, superintendent of the Ida district of Interstate Oil Pipe Line Co., died January 8 in a Shreveport hospital. He had completed almost 40 years of service for Interstate and its predecessor companies.

Andrew O. Steven, 26, engineer for Phillips Petroleum Co., died of injuries suffered when struck by a piece of pipe while inspecting a well January 8.

Nowery J. Smith, 54, president of Nowery J. Smith Co., oil-equipment manufacturer, Houston, died January 5 in Kerrville, Tex., following a heart attack December 19.

George W. Levangie, 54, director and general manager of Ganso Azul, American-owned oil company in Peru, died January 7 in a Doylestown, Pa., hospital. He formerly was vice president and field director for Standard Oil Co. of Argentina and adviser on petroleum to the American Economic Mission to the Middle East.

R. W. Rabb, plant superintendent; **E. E. Hillhouse,** shift foreman; and **J. B. Harvey** and **N. W. Beard,** fractionating operators for Shell Oil Co.'s cycling plant at Sheridan, Tex., were killed in a plant explosion January 8.

John Cheves King, Sr., 62, former marketing consultant for the southern region of Esso Standard Oil Co., died January 8 at his home in Richmond, Va.

Henry J. Sandblade, consulting engineer and vice president of Thomas Flexible Coupling Co. at Warren, Pa., died of a heart attack at Climax, Colo., January 5.

William J. Ranburger, chief production clerk for Warren Petroleum Corp. at Abilene, Tex., died there January 8.

J. B. Burnett, Thermal, Calif., independent geologist, died January 4.

John Broughton, 86, attorney for Gulf Oil Corp. more than 30 years, died January 11 in a Tyler, Tex., hospital.

James Kotulek, 52, Princeton, Ind., field superintendent for W. A. Schuller, died January 6.

Ernest L. Berg, 43, Midland, Tex., consulting geologist, died January 11 in a Midland hospital. He formerly was a geologist for Wilshire Oil Co. at Midland and for Standard Oil Co. of California in the Rocky Mountain area. He spent 6 years in Arabia for Arabian American Oil Co.

Charles H. Currier, 66, chairman of the board of Kewanee-Ross Corp., died recently in Buffalo, N. Y. He served two terms as president of the Tubular Exchanger Manufacturers Association, of which he was one of the founders.

J. M. P. McCraven, manager of the railway sales department of The Texas Co., died recently in Port Chester, N. Y., following a brief illness.

William C. Hay, 71, owner of Beverly Oil Co., died January 10 in Vancouver, B. C. He also was founder and owner of Blue Diamond Cement Co.

James Ray Murphy, 64, oil-lease broker, died January 8 in Tulsa.

Robert R. Crippen, 52, chemist for The Texas Co. for 27 years, died recently in Long Beach.

Fred Score, 79, former plant superintendent for Standard Oil Co. of California, died January 6 in Los Angeles.

John Ross Miller, 64, driller, died recently near Bakersfield, Calif.

BURTON DELINGPOLE FLANGES

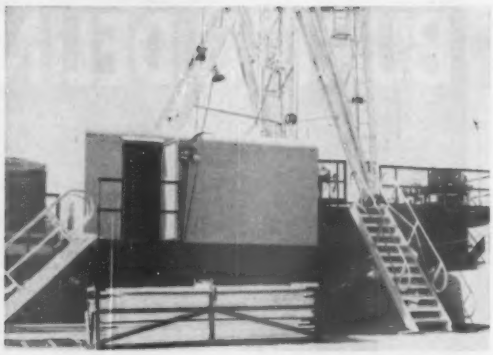
Seen Around Rigs all over the World

SOLID FORGED WELDLESS STEEL HIGH PRESSURE FLANGES

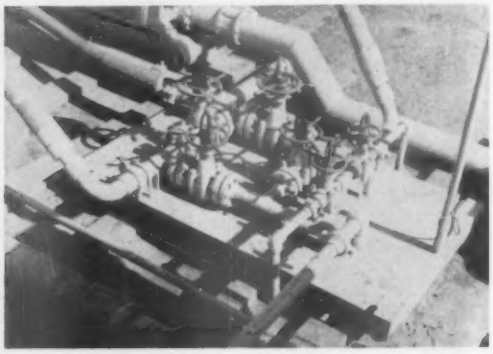
BURTON DELINGPOLE & CO. LTD. OLD HILL, STAFFS., ENGLAND

TELEPHONE : CRADLEY HEATH 6237-8 TELEGRAMS : STAMPINGS, CRADLEY HEATH

1 The new rig was completely assembled and tested before being accepted by Shell. After assembly and raising of the mast for test, the rig looked like this, with engine house and windbreak in place.



2 Level of engine and draw-works floor and that of the doghouse are 3½ ft. below that of rig floor. Sectionalized windbreak and engine house has been removed in this view.



3 Mud-discharge lines are manifolded together on a separate skid which includes much of the valving in the mud system. Moves are easier and pumping is more efficient.

SHELL'S 11,000-FT. JACKKNIFE RIG FEATURES . . .

Increased Efficiency Without Loss of Safety

Rig, now on shakedown run, is equipped with a 133-ft. mast and a sectionalized engine house designed for ease in rigging up and tearing down and packaging for moves

by Roy F. Carlson
West Texas District Editor

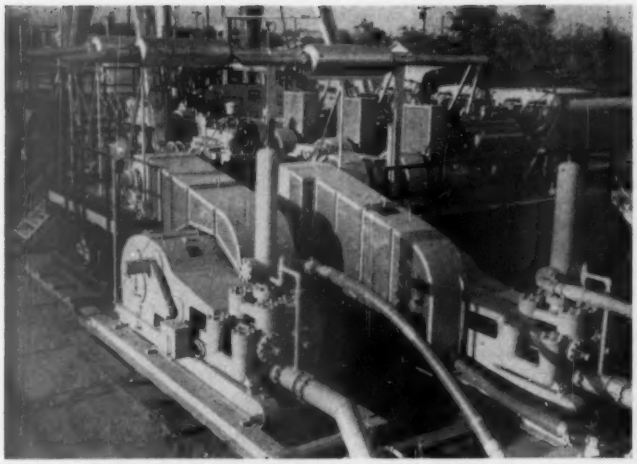
ONE of the newest rigs on the plains of the Permian basin is Shell Oil Co.'s Rig 22, an 11,000-ft. jackknife, designed with safety, efficiency, and speed in moving as prime considerations. It is getting its shakedown run drilling a well in Denton field in Lea County, New Mexico.

The rig features a low engine and draw-works substructure stepped down from the rig floor. The engine and draw-works substructure is at truck-bed height. This permits both engines and draw works to be skidded directly off the trucks onto the substructure or vice versa without use of ramps, a difficult and often dangerous procedure. The driller's doghouse is also on this level.

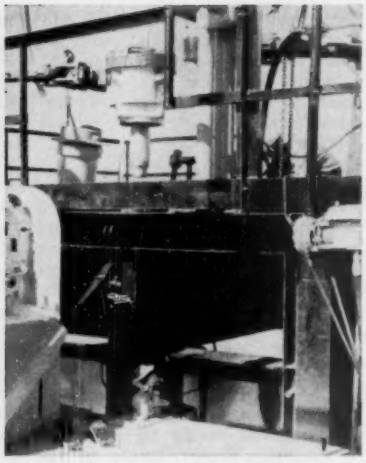
Engine skids are extended and covered to serve as part of the engine-room floor. Remaining floor areas around the draw works are covered with raised floor plating to form a flush, level floor all around the engines and draw works. The rig floor, too, incorporates a flush rotary table, so that it does not present any stepups or stepdowns for increased safety.

The stepdown feature places the driller off the rig floor and 3½ ft. below it on the draw-works floor level. At this position, the top of the rotary bushing is at about eye level, with the rig floor below shoulder level. This feature gives the driller an almost eye-level view of slips and elevators when tripping the drilling string, and it also affords him a position from which he can observe the rig floor and the blowout-preventer equipment at the same time.

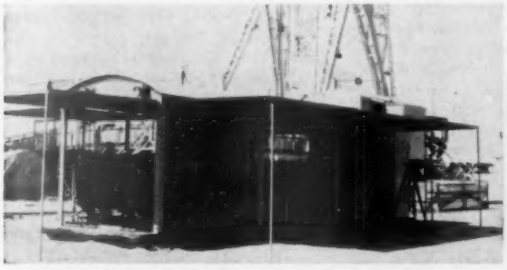
The stepdown feature shortens and eliminates the angle from the final drive from compound to draw works,



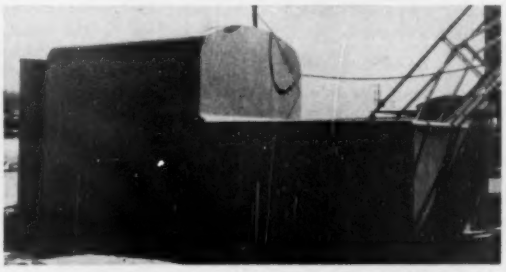
4 Low position of engines and draw works is illustrated in this view. Offsetting of the engine exhausts and mufflers was necessary to accommodate the upward-swinging compound sections when moving. One of the pin connections to hold the compound section is shown on last muffler support.



5 Both derrick floor and blowout preventers can be seen from driller's position at draw-works console. Controls for preventers are mounted near driller's position.



6 A utility house with swinging sides houses the electrical generators, an auxiliary pump, an air receiver, blowout-preventer controls, and closing unit.



7 A combination catch-all box and tool house is skid mounted. The lid of the box forms a ramp when tilted against the edge of the derrick floor.

but at the same time it lengthens the drive from draw works to rotary table, and makes an angle drive of it. This latter feature, however, has the effect of putting much of the rotary drive system into the rig floor rather than on it, serving further to clear the floor.

The lower substructure under the engines and draw works eliminates the buying and transporting of material used in construction of a higher substructure. A mud bucket is furnished on the rig for use in pulling wet strings, for protection of the driller at his lower level, and the rest of the crew.

In this stepdown arrangement, the spinning chain runs to the automatic cathead at a level higher than the cathead. It is held at that height by a roller over which it travels to the cathead. Where the chain passes over the driller's head, it runs through a guard made of a section of rotary hose.

Makeup torque is accurately controlled through use of a torque gage in the lead tong, and through incorporation of an automatically compensating cathead. The cathead clutch is actuated by a floating piston that automatically adjusts for wear. Adjustment of air pressure to the cathead clutch will regulate the line pull to the makeup tong and thus regulate makeup torque.

Power and Transmission

The new rig is powered by three V-12 engines, each of which is rated at 357 hp. at 1,050 r.p.m. for intermittent duty. The engines are all equipped with torque converters and drive through air clutches to the compound. Each of the engines is fitted with automatic shutters on the radiators. The temperature-controlled valve, called a shutterstat, regulates the air supply to a pneumatic cylinder which opens or closes the shutters as the engine temperature changes.

Air clutches are used throughout the rig. The engine clutches are fitted with a valve at each engine so that the clutch can be made inoperative at engine to prevent engaging the clutch from the driller's position while a man is working on an engine. The same arrangement is used for the mud-pump clutches, only in this case, the cutoff valves can be reached from ground level by a man working on the pumps.

The engine compound is of the swinging type, which makes it possible to move the individual rig drive units without breaking a compound chain or draining oil from the compound case. Dowel pins and spacers between the ends of the skids assure quick and accurate alignment of the independently skidded engines. To transport the rig drive units, the compound is merely pivoted and locked into a vertical position. The final drive section of the compound, therefore, moves with the first engine skid and successive sections with successive engines.

As each engine skid moves with the engine, the compound section, and

the exhaust piping and muffler, only three pieces constitute and move the entire engine and compound unit. The swinging feature of the compound makes it necessary to offset the exhaust piping to one side of the engine skid.

Mud System

Three steel mud pits are provided with the rig, with a mud-testing house made of the first of the pits. The first two pits are equipped with a trough running the length of each of the tanks, so that either of the tanks may be bypassed for cleaning. The tanks were made with a rounded bottom to make this cleaning easier.

The mud tanks are arranged in an L-shape, from the discharge mud line from the well to the pump suction. A steel mud house parallels the last tank and is fitted with sliding doors on both sides for ease in unloading sacked mud materials and mixing mud in the suction tank. Mud-pump discharge piping and valving are unitized and skid mounted.

Rig Lighting

Lengths of pipe that form the edges of the mud pits also serve as conduits for the light wiring. Breakout connections are furnished at each tank so that only short pieces of wiring connect the tanks and the light poles. This arrangement eliminates all overhead wiring.

Lighting for the remainder of the rig is arranged in much the same manner. Where possible, the wiring is permanently mounted in the substructure and mast so that only short jumpers are necessary for connecting various breakout boxes.

The placing and intensity of lighting in itself was designed after a great deal of investigation of lighting on several other rigs of a similar type. Minimum levels of illumination, measured in foot-candles, were set up for each area on the rig as a safety and efficiency measure. The system was designed with the fact in mind that good illumination is a strong factor in reducing the accident rate and in improving operating speed and efficiency.

Utility House

Separate twin generators in a packaged skid-mounted utility unit furnish alternating current for the rig lighting system and various electric motors. One of the generators serves as a standby unit while the other furnishes power.

An electric-motor-driven air compressor is also housed in the utility unit to furnish supplemental air to that furnished by the rig compressor system. This unit is automatically started if more air is needed than can be supplied by the rig unit. This unit is particularly necessary since the rig is equipped with air clutches, an auxiliary air hoist, air slips, and air impact wrenches in addition to other pneumatic equipment. The unit also houses an auxiliary water pump, a closing unit for the blowout preventers, and an air volume tank.

A remote blowout-preventer control system is also located in the utility house so that the preventers can be opened and closed from there. A like set of controls is located on the drawworks floor near the driller's position for similar operation. In addition, the preventers may be closed manually through operation of wheels from the ground level.

Miscellaneous Equipment

The auxiliary air hoist is located in a corner of the rig floor from which the operator can see the pipe racks, the rig floor, and a catchall box from which miscellaneous equipment might be lifted. The catchall box is mounted on one end of the skid, on the other end of which is a steel tool house. The catchall box cover consists of a plate that is hinged to the end of the box so that it forms a ramp when tilted against the edge of the rig floor.

The rig is equipped with double hydraulic blowout preventers, controlled as described above. Tracks and a dolly are installed in the substructure of the rig for ease in handling the blowout equipment.

The rig is equipped with a 133-ft. mast, and a sectionalized engine house designed for ease in rigging up and tearing down and packaging for moves. The substructure is of the side box type. An adjustable stabbing board is installed in the mast.

The catwalk is made in two sections that can be turned upside down so that sections of the pipe rack may be placed in them for packaging during moves. The draw works is equipped with an automatic drilling-weight control.

Purchase of the rig was a little unusual in that Shell engineers set specifications for the complete rig with the exception of pipe racks, and asked for bids from several rig manufacturers. The rig was then completely test-assembled by the supplier before being accepted by Shell.

Test Drill-Collar String

Another unusual feature of the first well the rig is drilling is that it is being drilled using an experimental string of drill collars to test and compare specially designed drill collar joints of the 60° and 90° A.P.I. type in service under the same conditions. The drill collar connections were designed by the special A.P.I. Subcommittee on Drill Collars and are so arranged that A.P.I. 90° and A.P.I. 60° connections are alternated throughout the string. All joints include machined stress-relief grooves cut at the last engaged thread of the connections. All connections will be made up with closely controlled torque and under other closely supervised conditions to determine comparative performance of the two types of joints.

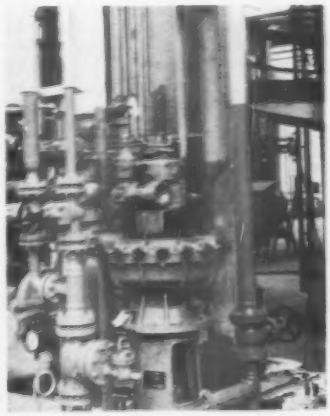
What Is This Equipment?

THE interesting petroleum equipment appearing in the center of this photograph was recently installed by a major oil company on one of its California properties.

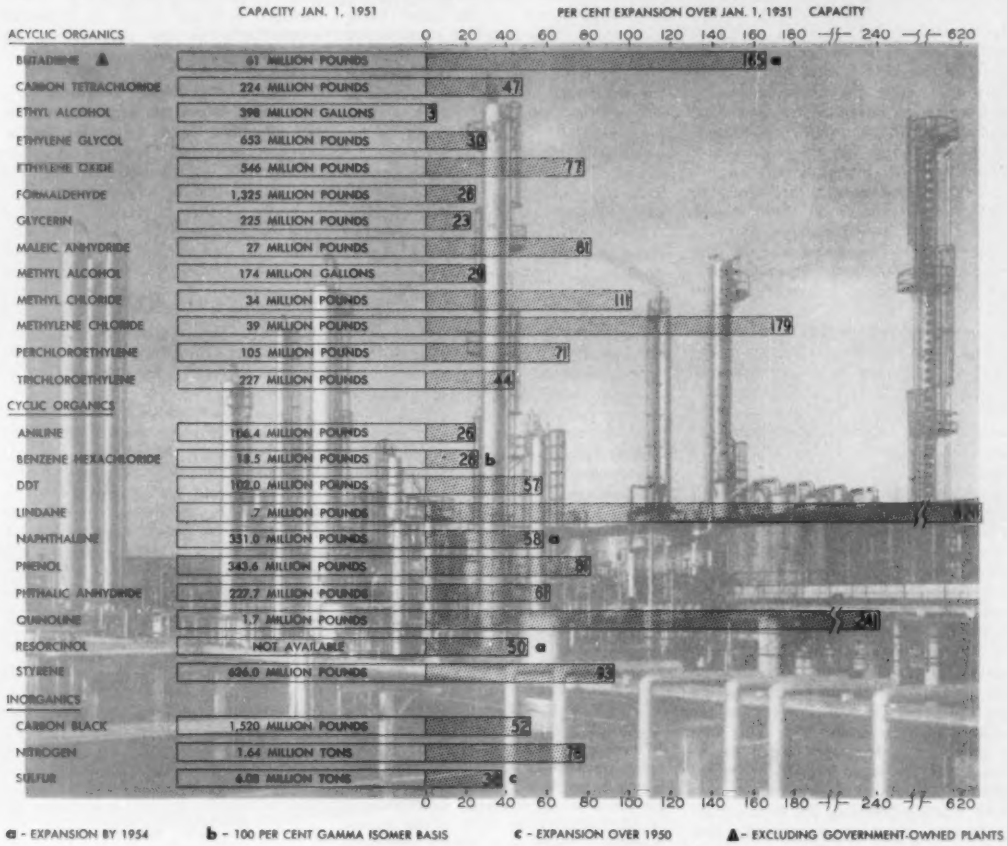
What is it?

Place a check in the square by the "correct" statement given below. Then turn to page 122 for a checkup on this Journal "check chart" item.

- ☐ High-speed blower on catalyst regeneration burner.
- ☐ New stuffingboxless pump on products-pipe-line unit.
- ☐ Water-supply well pump on large-scale water-injection project.
- ☐ Central refrigeration unit in new dewaxing process for motor oil.
- ☐ Experimental rotary-drilling turbine motor, full scale.
- ☐ Steam turbine on vertical pump, serving F.C.C. unit.



EXPANSION GOALS OF CHEMICALS DERIVABLE WHOLLY OR IN PART FROM PETROLEUM


CAPACITY JAN. 1, 1951
PER CENT EXPANSION OVER JAN. 1, 1951 CAPACITY
0 20 40 60 80 100 120 140 160 180 240 620
ACYCLIC ORGANICS
BUTADIENE ▲ 61 MILLION POUNDS 165 a
CARBON TETRACHLORIDE 224 MILLION POUNDS 47
ETHYL ALCOHOL 398 MILLION GALLONS 3
ETHYLENE GLYCOL 653 MILLION POUNDS 30
ETHYLENE OXIDE 546 MILLION POUNDS 77
FORMALDEHYDE 1,325 MILLION POUNDS 28
GLYCERIN 225 MILLION POUNDS 23
MALEIC ANHYDRIDE 27 MILLION POUNDS 81
METHYL ALCOHOL 174 MILLION GALLONS 29
METHYL CHLORIDE 34 MILLION POUNDS 111
METHYLENE CHLORIDE 39 MILLION POUNDS 179
PERCHLOROETHYLENE 105 MILLION POUNDS 71
TRICHLOROETHYLENE 227 MILLION POUNDS 44
CYCLIC ORGANICS
ANILINE 106.4 MILLION POUNDS 26
BENZENE HEXACHLORIDE 18.5 MILLION POUNDS 28 b
DDT 102.0 MILLION POUNDS 57
LINDANE .7 MILLION POUNDS 428
NAPHTHALENE 331.0 MILLION POUNDS 58 a
PHENOL 343.6 MILLION POUNDS 86
PHTHALIC ANHYDRIDE 227.7 MILLION POUNDS 68
QUINOLINE 1.7 MILLION POUNDS 241
RESORCINOL NOT AVAILABLE 50 a
STYRENE 606.0 MILLION POUNDS 83
INORGANICS
CARBON BLACK 1,520 MILLION POUNDS 52
NITROGEN 1.64 MILLION TONS 76
SULFUR 6.08 MILLION TONS 34 c
0 20 40 60 80 100 120 140 160 180 240 620

a - EXPANSION BY 1954 b - 100 PER CENT GAMMA ISOMER BASIS c - EXPANSION OVER 1950 ▲- EXCLUDING GOVERNMENT-OWNED PLANTS

PETROCHEM REPORT:

Success Story . . . Plenteous Raw Materials, Assured and Expanding Market, Right Price

by Martin Buck*

THE recent unprecedented growth of chemicals from petroleum hydrocarbon raw materials is a matter of record, and the literature seems to be flooded with forecasts of demand and methods of forecasting demand. Rather than add to these many statistics, which unquestionably are valuable tools in their place, attention will be devoted here to some of the fundamental factors which determine the growth of any chemical, and to investigating why these factors are so strongly influencing petrochemical growth.

The organic-chemical literature teaches us how to make hundreds of thousand of compounds, but relatively few have reached substantial volumes in the market place. Most either cost too much or have insufficient utility. It is not enough to produce an interesting molecule of little utility, even for a low price, nor is it sufficient to produce a useful molecule priced too high. Substantial sales volume can only be achieved when both utility and price demands are met.

Fundamentally, therefore, chemicals from petroleum hydrocarbons have been produced in large volumes only when they were useful and could be sold at the right prices. As an obvious corollary, as utility increased and/or

*Manager, Manufacturing Development Department Shell Chemical Corp. Paper presented at semiannual meeting, Manufacturing Chemists Association, Inc., New York.

price could be reduced, sales volume, or growth rate, generally increased.

Low-cost raw materials . . . It was natural for the petrochemical industry to gain its entry into the chemical economy largely by supplying existing raw materials, intermediates, and occasionally consumer products, at lower prices. It is to be emphasized that utility of these materials was already established and growth rate could be and was stimulated by lower prices. Lower prices were made possible by a plentiful and reliable source of raw materials, a continually improving technology, and the cumulative effect of still larger volume.

Raw materials in this classification include the organic-chemical building blocks, ethylene, propylene, butylenes, and more recently, cyclopentadiene, benzene, toluene, xylenes and acetylene; intermediates include the primary and secondary alcohols from the olefins mentioned, acetone and higher ketones, and more recently glycerin and phenol. The natural or coal-tar sources of these materials were augmented and in some cases largely displaced. The list is far from complete, it is growing, and it will continue to grow as long as the utility remains and the price is right.

Having established a plentiful supply of low-cost raw materials and intermediates, great stimulus was given to the development of new products where the estimated price was right but the utility had to be established. This took a little longer but soon began to account for the rapid growth of recent history. Usually there was competition with existing products but occasionally birth was given to an entirely new field. At this stage, also, competition between processes as well as competition between products became important factors tending to keep costs low.

Process competition . . . It is characteristic of the industry and its highly developed technology to establish competitive processes for manufacturing the same commodity. Examples include three methods for manufacturing ethyl alcohol—two from ethylene and one by the Fischer-Tropsch process; two methods for manufacturing isopropyl alcohol—one by direct catalytic hydration and one utilizing sulfuric acid; two methods for making n-butyl alcohol—one by the Oxo process from propylene and one by condensation of ethyl alcohol; three methods for manufacturing acrylonitrile—one starting with acetylene, one with ethylene, and one with propylene; two methods for manufacturing ethylene oxide—one by direct oxidation and one by the chlorohydrination route; three methods for manufacturing vinyl chloride—one from acetylene and two from ethylene; at least three methods for manufacturing phenol — the latest being the cumene hydroperoxide route which adds to the older processes utilizing chlorine or sulfuric acid; two methods for manufacturing phthalic anhydride —one from orthoxylene and one from naphthalene; at least two methods for manufacturing acetylene from hydrocarbons—the Wulff process and the Sachsse process, to add to the older route from calcium carbide.

Commercial success breeds competition not only in process but also in product, and the industry abounds with examples. In the solvent field isopropyl alcohol competes with ethyl alcohol and acetates compete with ketones; the polyhydrics, glycerin, pentaerythritol, propylene glycol, and diethylene glycol compete with each other; polyvinyl chloride competes with polythene, vinyl chloride copolymers compete with polystyrne; epoxy resins compete with the phenolics; diallyl phthalate resins compete with melamine. These are some of the fruits of research of a dynamic industry. The list could be extended to include many more, but the important point is the energetic use being made of all phases of technology to supply needed petrochemicals at the lowest possible price.

New product development . . . Perhaps the most rapidly growing segment of this class is the organic chemicals used in the agricultural field. These are the synthetic organic insecticides, herbicides, defoliants, and soil fumigants which have developed only in the last 10 years to an estimated sales volume of $125,000,000 in 1951 at the manufacturers' level and before formulation. In this case the rate of development of technology coincided with the supply of raw materials and intermediates for the low cost manufacture of the chemicals. They include DDT, methoxychlor, benzene hexachloride, Chlordane, Aldrin, pentachlorophenol, aromatic oils, DD, ethylene dibromide, and many others.

These chemicals have been a major factor in maintaining the nation's agricultural production at the needed high level. Increasing the world's production of food and clothing from its limited amount of arable land is so basic that it is hard to conceive of greater direct utility for an organic chemical. Technological activity in this field is great, and continued rapid rate of growth, can be expected because of utility and low cost.

At least two companies now in petrochemicals in this country started in the field via the manufacture of nitrogen fertilizers utilizing hydrocarbons as the source of hydrogen for ammonia. Again, few things are more fundamental than nitrogen for the soil to grow more food and clothing. When nitrogen fertilizer could be produced synthetically at the right price, its continued growth was assured.

High-molecular-weight polymers . . . The most important segment of the petrochemical field dollarwise is the polymer segment which utilizes high-molecular-weight compounds for the manufacture of rubber products, synthetic fibers, molded plastics, laminates, adhesives, paints and plastic sheeting and film. The current dollar value of this field before processing has been estimated at 2 billion dollars per year, excluding the natural and cellulosic polymers. This tremendous growth has resulted because the raw materials and the intermediates were available at the right price.

The most important segments of this field are synthetic rubber, synthetic resins including fibers, and plastics. Synthetic rubber was developed under crisis conditions during World War II, and American technology earned one of its greatest tributes by doing the job so well that both the price and the quality now successfully compete with the natural product. This is undoubtedly the most important example of a steady trend, thhe use of synthetic organics to augment and then partially replace a time-honored natural product. The value of the synthetic rubber produced annually today is more than $250,000,000, and continued growth can be expected at a faster rate than the general economy.

Sales of synthetic resins, including the resin fibers, now approach a billion dollars. Improved synthetic resins for the protective-coating field are rapidly changing the character of this industry. The basic reason is, once more, better products at the right prices. The plastic field follows the same pattern. Merely to mention a few of the petrochemicals industry's contribution to the high-polymer field is sufficient to illustrate its dependence upon low-cost raw materials and intermediates for its continued growth.

Detergents . . . In the field of synthetic detergents is another example of great stimulus to development from the availability of a plentiful supply of raw materials at low cost. In this case utility superior to the available natural product was the goal, and its success is measured by the magnitude of the national annual business which exceeded $15,000,000 last year. The price was right, the utility was more than competitive, and the result is birth and growth of a new industry based largely on alkyl aryl sulfonates in this country and alkyl sulfates abroad.

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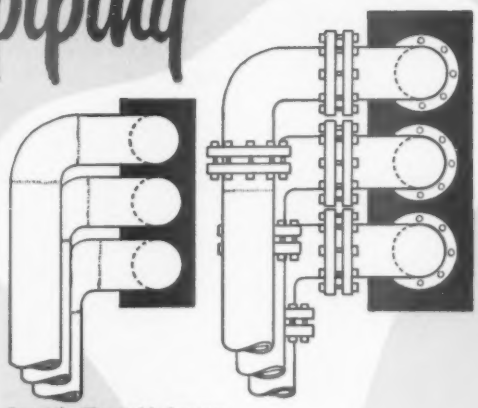

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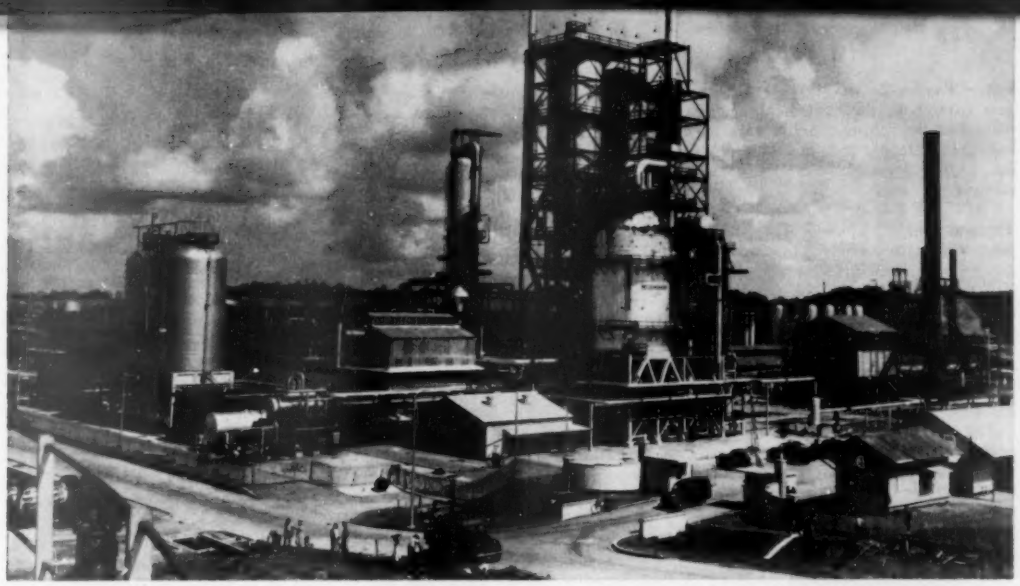


View of the U.O.P. fluid catalytic cracking plant with reforming unit and gas-concentration plant in background on right.

Trinidad Refinery Completes Its Modernization

Many of the large vessels were fabricated in Trinidad, steel being supplied from the U. K.

DURING the postwar period it became evident that a planned modernization scheme for the Pointe-A-Pierre refinery of Trinidad Leaseholds, Ltd., was essential. Among the chief reasons for this decision were (1) two of the three thermal cracking units were obsolescent and needed replacement; (2) it was evident that a competitive premium gasoline would be necessary sooner or later, and (3) the refinery was short of cracking capacity for increased crude throughput and it was becoming necessary to route a considerable amount of straightrun fuel oil to bunker fuel.

The decision was made to install a fluid catalytic cracking unit, a vacuum flash unit for preparation of catalytic cracker feed stock, and equipment for treatment of products. Construction work was begun in September 1950.

Construction work . . . The work was divided into two main groups: (1) New plants such as catalytic cracker, vacuum flash unit, catalytic gasoline acid-treating plant, catalytic gasoline rerun unit, and caustic-wash plant, all of which were designed by Universal Oil Products Co. and constructed and engineered by Foster Wheeler, Ltd.; (2) revamp of existing plants such as thermal cracking gas-concentration section, catalytic cracker and reformer gas-concentration section, conversion of two thermal cracking plants to a vacuum bottoms visbreaker and a combined skimming and visbreaking unit for heavy crude, H_2S scrubbers, B.B. wash plant, etc.

Process design was again carried out by U.O.P., while engineering work on all these plants being carried out by Trinidad Leaseholds, Ltd.

All construction work was completed and plants were in operation by the end of the summer of 1952.

Brief details of the new and revamped plants are as follows:

Fluid catalytic cracking plant . . . This unit is of U.O.P. design with elevated reactor and pressured regenerator, the former designed to operate at 9 psig. and the latter 17 psig. Using the microspheroidal synthetic silica alumina catalyst, the unit has been designed to handle 15,000 bbl. per day of vacuum gas oils. The regenerator, a vessel of 38-ft. 8-in. diameter, is lined with a monolithic type of refractory and has been designed to burn off 6 tons of coke per hour.

The reactor, a vessel of 23-ft. diameter, is unlined. Both reactor and regenerator are fitted with Buell cyclones for removal of catalyst fines, no electrostatic precipitators being found necessary. The blower is a multistage centrifugal type capable of handling 75 tons of air per hour and driven by a 4,800-b.hp. turbine.

Steam generators are used to remove heat from the regenerator flue gases, fractionator column bottoms, and heavy cycle oil streams, and at the design throughput the unit is a net producer of steam.

The fractionating column, a vessel of 14-ft. diameter and 97 ft. high, is fitted with alloy bubble decks and is also alloy lined in the lower half.

Five 600-hp. 2-cycle gas-driven compressors compress the gas to 200 psig. for processing in the gas-concentration system.

Gas-concentration system . . . The modification of the reformer gas concentration system to take the gas and gasoline from the catalytic-cracking unit was simplified to a certain extent by the fact that it was a high-capacity unit designed to handle gas and reformate from a two-stage reformer on maximum C_4 production for alkylation, an operation which although considered a wartime necessity, subsequently became uneconomical. The change to single-stage reforming also released one flash fractionator which has been used as an additional debutanizer in the present gas-concentration system and one equiflux down-draft heater which has been modified and used as the heater in the new vacuum flash unit.

With the installation of the additional debutanizer and also a new column for splitting the stabilized catalytic gasoline into light and heavy fractions for variation of subsequent treatment, the modified gas-concentration system handles the rich gas and unstabilized prod-

ucts from both the catalytic cracking plant and the reformer and allows the stabilized catalytic gasoline and reformate to be produced as separate streams.

Vacuum unit . . . About 25,000 bbl. per day of mixed reduced crudes from the topping plants is charged to this unit to produce 15,000 bbl. per day of vacuum gas oil as feed stock for the catalytic cracking unit. The asphalt from this plant is handled in a visbreaker which was previously one of the thermal cracking units, but which has now been modified to a visbreaker.

The main items of equipment are the heater, an equiflux down-draft type which was formerly on reformer duty but which has been relocated and modified, and the vacuum column itself, a vessel of 21-ft. diameter lined with stainless steel and fitted with alloy bubble decks.

Acid-treating unit . . . This unit acid-treats the heavy catalytic gasoline from the gasoline splitter at the gas concentration system. It is of conventional design and consists of a premixer and settler for an acid sludge treat, a similar arrangement for an acid treat followed by a water-wash, caustic wash and water-wash in that order.

Catalytic gasoline rerun unit . . . This steam heated unit redistills the treated catalytic gasoline from the new acid-treating plant. It consists of a single fractionating column which can be operated at atmospheric pressure or under vacuum.

Caustic wash unit . . . This plant caustic washes that portion of the catalytic gasoline not requiring acid treatment, and both this stream and the rerun heavy catalytic gasoline are continuously and separately inhibited.

Thermal cracking plant area . . . Plant modifications in this area followed the release of the two older thermal cracking units and both these units have now been revamped to once-through visbreakers. One of these units handles the bottoms from the vacuum flash unit and the other handles a particularly heavy reduced crude. Rearrangement of equipment on the low-pressure cracked residue flashing system allowed the addition of a simple crude skimming section which obtains its main heat from visbreaker bottoms.

Alterations to the remaining thermal cracking plant cover general improvements and extensions to the gas-concentration section and include the installation of a depropanizer column and ancillary equipment and also extension of the regenerative caustic wash B.B. scrubbing system.

A reaction chamber from one of the old thermal cracking units has been relocated and installed in series with the reaction chamber on the remaining thermal cracking plant.

Modifications to the residuum flashing section in addition to the skimming plant mentioned above consist mainly of new pump and coolers to take increased load from the visbreakers and low-pressure flashing at low temperature for explosivity control of bunker fuels.

Sulfur recovery . . . Additional facilities for recovery of maximum H_2S to increase sulfur production, include a new and larger replacement diethanolamine reactivator system to handle the D.E.A. streams from three scrubbers. Two of these scrubbers are additional equipment and consist of a vapor-phase scrubber for absorber lean gas from reformer and catalytic cracking plant gas-concentration system and a liquid-phase scrubber for feed to the polymerization unit.

An additional Claus kiln is being installed to handle the increased H_2S recovered.

Utilities . . . As a result of the various process modifications, extensions to utilities include a new 65,000-lb. per hour steam boiler and a 6,000-g.p.m. induced-draft cooling tower.

Storage . . . Storage capacity which was 4 million barrels in 1945 has now been increased to about 5½ million and a construction program is being carried out to increase this to 6 million barrels.

Construction Details

An unusual feature of the construction program was the fabrication of many of the large vessels in Trinidad, the rolled steel sheet being supplied from the United Kingdom. The main vessels fabricated locally were the reactor, regenerator, fractionator, and the two catalyst-storage hoppers at the catalytic cracking plant and the main column at the vacuum flash plant. In addition, the greater part of the pipe work for these units was fabricated locally.

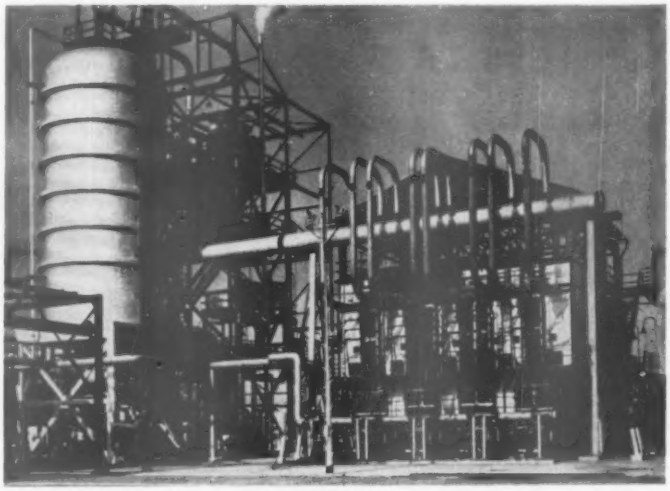
The extensive welding program necessitated the recruiting and training of local personnel, and a welding school was set up in the refinery for this purpose. The quality of the welding was carefully controlled by the use of X-ray equipment.

For the erection of the equipment on the four main plants, two guy derricks were employed, the one at the catalytic cracker being 226 ft. in height with a lifting capacity of 75 tons at 50-ft. radius. In addition, three mobile cranes were used of 10-20-ton capacity each.

The total steel requirement for the whole scheme was approximately 8,000 tons which together with other constructional materials resulted in a total material requirement of about 27,000 tons.

The additional installed horsepower on pumping units is approximately 3,000, with the turboblower and gas compressors increasing this total horsepower to 11,150.

The extra pump capacity installed amounts to the equivalent of 21.6 million gallons per day.



View of the vacuum flash unit, where 25,000 bbl. per day of mixed reduced crudes from the topping plant is charged.

Pump Power Parade

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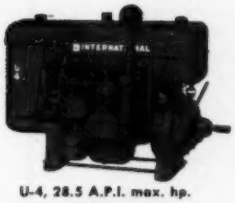
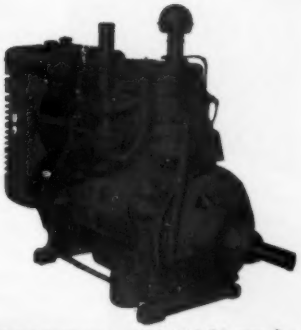
U-6, 37.5 A.P.I. max. hp. at 1500 r.p.m.



U-4, 28.5 A.P.I. max. hp. at 1800 r.p.m.



U-9, 49 A.P.I. max. hp. at 1500 r.p.m.

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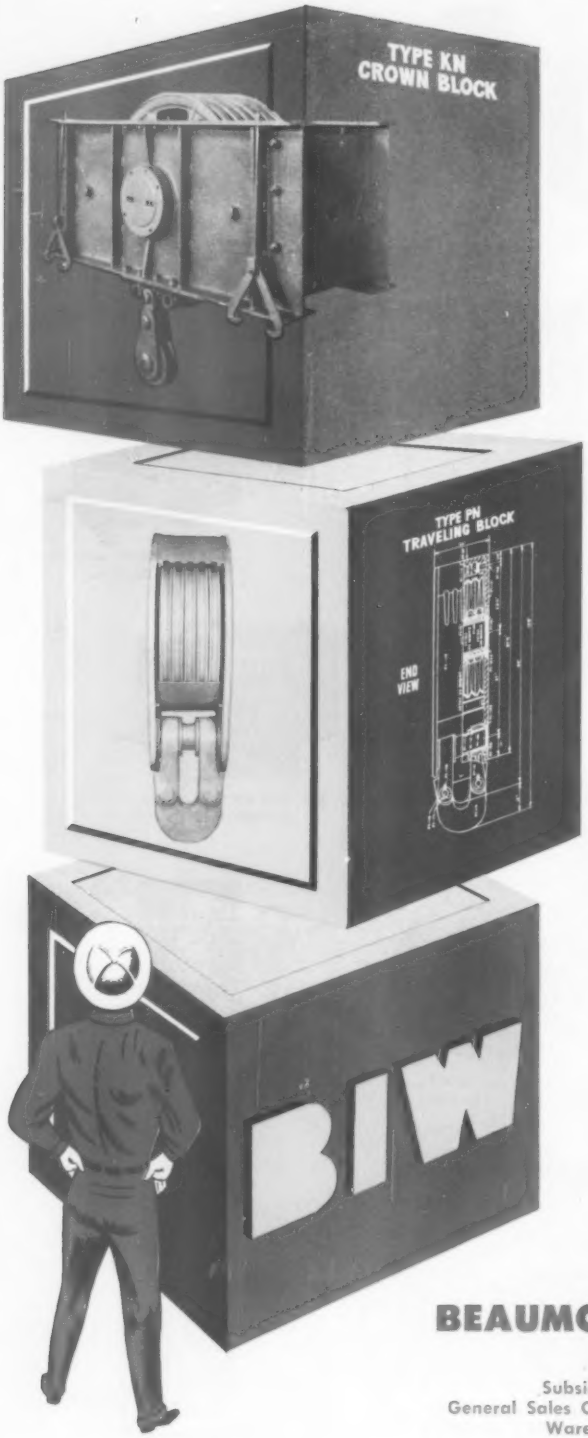

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New, two way bearings on the Type KN Crown Block and the Type PN Traveling Block handle both radial and thrust loads as pure right angle loads. This design increases bearing capacity, reduces weight and cuts space requirements, resulting in longer bearing life, reduced maintenance and lower replacement cost.

The Crown Block can be hoisted through the water table in one piece. Because the center pin is on the center line of the beam, either flange of the beam can be set on the water table beams. The narrow width of the 300 ton capacity Traveling Block permits maximum pipe racking for deep drilling. With its low center of gravity, kicking or side lift is kept to a minimum. Bearings and sheaves are interchangeable between Crown and Traveling blocks.

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Removing isotope from container.

Radioactive Isotope-Equipped Go-Devil Cuts Costs for Anglo-Iranian

USE of a radioactive isotope attached to a go-devil shows considerable economics, both for the commissioning period of a pipe line, and for later normal working.

For normal working a 75-millicuries cobalt 60 source, used in conjunction with a light monitor-type detector, is of great assistance in carrying out normal go-deviling. A rate meter unit gives a reasonable chance of pin pointing the go-devil should it get stuck.

For the commissioning period when the line is first go-deviled and the chance of the go-devil sticking is greater, an isotope of higher millicurie value is needed. Higher standards of safety precaution are required, however.

Both of these conclusions, based on equipment commercially available at this time, may be influenced for the better as the sensitivity of portable detectors is improved.

First tests . . . In the spring of 1951 Anglo-Iranian Oil Co. commissioned a 57-mile long 12-in. pipe line from Finnart on the west coast of Scotland to the Grangemouth refinery of Scottish Oils, Ltd., on the east coast.

Early during the construction of the line it was decided to investigate the possibility of using radioactive isotopes and Geiger counters as a means of locating a go-devil in the pipe line.

The first test was carried out on an 8-in. water line buried at a distance below ground varying from 18 in. to 5 ft. For the test a 320 millicurie source of cobalt was used and a civil defense monitor, using a single Geiger tube as detector. The results of this test were disappointing as the detector hardly showed any indication of the underground source even though the passage of the go-devil was distinctly audible.

Accordingly a second trial was arranged on the same line using a 620 millicurie source of cobalt 60 and a more sensitive detector having three Geiger tubes and various sensitivities and time constants. This time the source was detected on several occasions as it passed underground but the indications were not of sufficient magnitude to be considered as a really positive indication.

In spite of these rather discouraging results and the fact that the source used, i.e., 620 millicuries was somewhat too strong for normal handling, it was decided to proceed with the use of radioactive isotopes when the Finnart Grangemouth pipe line was commissioned.

Equipment . . . Since it appeared that there was little hope of locating a go-devil when stopped in a line at depths below 2-3 ft., it was decided to use relatively weak sources which could, with reasonable care, be handled with complete safety.

The following equipment was therefore procured:

Radioactive sources of cobalt 60-75 millicuries

Radioactive sources of cobalt 60-35 millicuries

Radiation monitors type 1043

Rate meter unit type 1011B

Isotope containers

Ten-inch handling tongs.

The radiation monitor type 1043 is a completely self contained portable instrument, with pistol grip, with ranges 0-0.125 and 1-1.25 rontgen per hour for gamma radiation. The weight is 4 lb.

The rate meter unit type 1011B was perhaps the most sensitive detector that could be classed as reasonably portable. Its sensitivity was about 100 times that of the monitor type.

The isotope containers were small iron cylinders 2 in. long and ¾ in. in diameter with detachable spring-loaded caps. A spring clip inside the cylinder fitted around the isotope holder which slipped inside and clicked into position. The containers were welded on to the front supporting plate of the rear rubber disk of the go-devil.

Pipe-line tests . . . Several runs of the go-devil were made and the use of the radioactive isotope proved very successful, provided that certain limitations are recognized.

At the various manifolds the radioisotope proved invaluable in locating, within an inch or two, the exact position of the go-devil. For this purpose the monitor-type detector proved adequate. On several occasion the go-devil stuck in a stop valve, and by being able to locate its exact position in relation to the valves it was possible to extract it with a minimum amount of damage and spillage.

It also enabled the go-devil to be maneuvered to insure the minimum delay in operating the go-devil in the scraper pit. On occasions the monitor was used when the go-devil stuck owing to obstructions in the line. When the approximate position had been found by other methods and the line uncovered at this point, it was advantageous to locate the go-devil exactly by the use of the monitor-type detector. In this way the line could be cut exactly in the best position.

Buried lines . . . Where the line was buried the monitor-type detector was, for practical purposes, useless. The more sensitive rate meter would, however, locate the 35 millicurie source, when the go-devil was stationary, at depths varying from 2 to 4 ft. Through water alone or spongy peat detections were made at over 4 ft. This depth fell off sharply to little over 2 ft. where the soil was hard packed and stony, for example roads and clay fields which had been settled for a long time.

With the 75-millicurie source, the above results were more certain and detection at 3 ft. 6 in. became reasonably certain even with the go-devil on the move.

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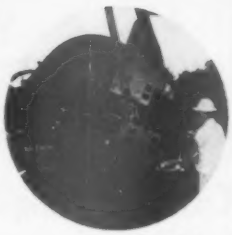

*Reg. TM

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2. POSITIVE LUBRICATION . . . chain has many oil films because of the many contacts between rollers and sprocket teeth.
3. RESERVE POWER IS PLENTIFUL — performance has proved the extremely high reserve capacity of a chain drive before distortion or breakage. With roller chain, tension members are separate and distinct.

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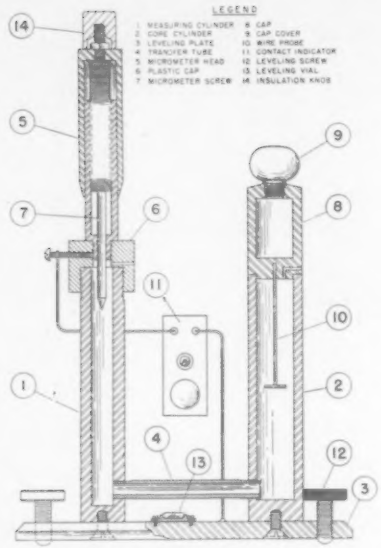

Fig. 1—Bulk-volume cell.

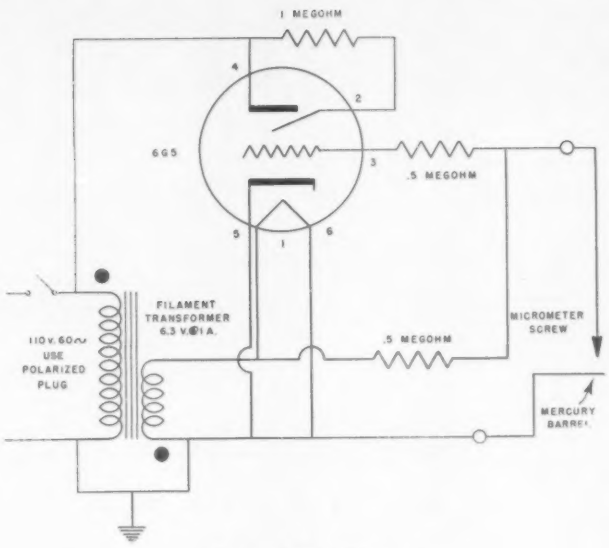

Fig. 2—Contact indicator.

Improved Bulk-Volume Cell Speeds Porosity Determinations

Porosity as determined in core analysis is a measure of the volume of the interconnected interstices within a rock sample. It usually is found by making two independent measurements on a core sample. One measurement is made to determine the volume of the interconnected pore spaces and the second to determine the bulk volume of the sample.

A widely used method of determining the bulk volume of a test sample is to measure the volume of mercury displaced by the sample, using a conventional pycnometer. In many laboratories this measurement has been simplified by measuring, with a micrometer, the change of the mercury level when the sample is immersed in a cell of constant bore. An electrical contact is used in measuring the rise of the mercury level.

Many such bulk-volume cells, however, do not give a high degree of accuracy because of arcing at the electrical contact, distortion of the mercury meniscus, use of an inferior micrometer, and other minor factors which can, and frequently do, play an important part in the accuracy of the method.

by H. C. Hamontre* and Cleo G. Rall†

AN accurate and rapid method of determining the porosity of small and large core samples has been devised by the improvement of the commonly used (electrical contact) bulk-volume cell. Errors have been reduced to less than 1 per cent by the elimination of arcing at the electrical contact and accompanying oxidation at the mercury level, through use of an electronic contact indicator which employs a very small current flow. Several improvements in design and construction also were necessary to obtain higher accuracy than that attained with other less-precise instruments.

The elimination of mercury weighing as required by the mercury pycnometer greatly reduces the time needed for porosity determinations. The writers show close agreement in bulk-volume measurements obtained by the use of this new device and the mercury pycnometer. For routine core work the higher accuracy of the pycnometer can be sacrificed for the greater speed and relatively high accuracy of the electronic bulk-volume cell.

Simplicity of operation is indicated by the comparison of measurements made by an experienced and an inexperienced analyst. Comparative results on any one sample were within 0.3 per cent. Such a device should prove valuable to those engaged in routine core work, particularly where numerous samples must be analyzed.

This apparently simple device was carefully studied, and a unit believed to be superior to those used previously was developed in the Bureau of Mines laboratories at Bartlesville. The new unit does not differ greatly from those used before, except that an electronic circuit is used to eliminate arcing between the micrometer tip and the mercury. Other differences consist principally of more precise workmanship. The cell developed does not give the accuracy that may be obtained by the careful use of a pycnometer but is satisfactory for most routine work.

*Petroleum engineer, and †chemist, Bureau of Mines, Bartlesville, Okla. The work upon which this article was based was done under cooperative agreements between the Bureau of Mines, United States Department of the Interior, and the State of Oklahoma.

Design of Cell

The bulk-volume cell (Fig. 1) is composed of two stainless-steel cylinders (1 and 2), mounted vertically on a leveling plate (3) and connected at the bottom by a tube (4), which allows free passage of mercury from one cylinder to the other. A micrometer head (5), mounted in a plastic cap (6), is fastened to the top of Cylinder 1. A micrometer screw (7), extends into the bore of Cylinder 1 and is tapered to prevent mercury from adhering to the point when the screw is withdrawn from the mercury. Cylinder 2 is slightly greater in diameter than the core

sample to be measured. A cap (8), provided to fit the top of Cylinder 2, is filled with mercury to insure enough weight in the cap to force the core below the surface of the mercury in the cylinder. A probe (10) is fastened to the bottom of the weighted cap and extends into Cylinder 2 far enough to insure complete submersion in the mercury of a spiral on the end of the probe. Air vents are provided in Cap 8 and in plastic Cap 6 to permit free movement of air into both cylinders. A leveling vial (13) is fastened to base plate 3, and three leveling screws (12) are placed in the base plate, two in the corners of one end and one in the center of the other end. An electronic contact indicator (11), connected between the insulated micrometer head and Cylinder 1, indicates contact between the micrometer screw and the mercury column in the cylinder.

Contact Indicator

The contact indicator (Fig. 2) is designed to make use of the characteristics of a type 6G5 electron tube (electric eye). The tube is essentially a complete vacuum-tube voltmeter and indicates a change in voltage by a change in closure angle of a pattern on a fluorescent screen. Application of a negative potential of 4 to 6 volts to the grid of the tube causes the pattern to close. Conversely, removal of such a voltage causes the pattern to open. In this circuit, the line voltage (110-volt, a.c.) is applied to the plate of the tube. A grid-bias voltage of about 6 volts a.c., which differs by a phase angle of 180° from the plate voltage, is obtained from the filament transformer by grounding the proper terminal and is applied through two 0.5-megohm resistors in series with the grid of the tube. One contact, the micrometer screw, is attached to the junction of these two resistors and the other, the mercury column, to a ground connection. When the contacts are closed, the junction point of the resistors is grounded, short-circuiting the grid-bias circuit and causing the pattern on the tube to open. The current flow through the contacts is limited by the 0.5-megohm resistors to less than ½ ma. The exact amount of current depends on the particular tube used. It is essential that the phase of the filament transformer be correct and that a polarized plug and socket be used on the 110-volt supply line.

The circuit of the contact indicator is designed to maintain the accuracy of the instrument by employing a very small current flow (2×10^{-7} amp.) when the circuit is closed. This small current minimizes arcing between the micrometer screw and mercury meniscus. Thus, the inaccuracies caused directly by the arcing, and indirectly by the oxidation of the mercury, are eliminated.

Precautions in Construction

For best results, several details of construction were found to be important. The cylinders of the instrument must be made of nonmagnetic steel (type 303 stainless steel was found to give good results); they must be cylindrically bored, and taper must be reduced to a minimum (less than 0.0001 in. taper per inch of length). To prevent distortion of the mercury meniscus by rough spots in the barrels, the cylinders should be polished to a mirror finish by lapping or honing. Either process gives satisfactory results, but honing gives a better finish, and dimensional control is easier to maintain.

Cylinder 1 should have a bore of about ½ in. If it is less than ½ in. in diameter, the changing contact angle between the mercury and the cylinder, because of unavoidable impurities in the mercury and on the walls of the cylinder, has a large effect on the mercury level in the center of the cylinder, at the point of contact with the micrometer. If either cylinder is larger than necessary, the accuracy of the cell obviously is reduced.

The micrometer head (5) (Fig. 1) is made of stainless steel to prevent corrosion and to insure a clean contact surface between the micrometer-screw probe and the mercury column. The micrometer-screw probe has a 30° taper at the end and a flat contact surface on the point approximately 0.020 in. in diameter. The flat surface is large enough to insure positive contact with the mercury meniscus but is small enough to prevent the mercury from adhering to it and thus distorting the meniscus. It is essential that the micrometer screw does not rotate eccentrically, as it moves vertically in the barrel. For that reason, the micrometer-screw probe is made ¼ in. in diameter to prevent being bent in handling.

Routine bulk-volume determinations are made at the B. of M. Bartlesville laboratories on samples ¾, 1, and 1½ in. in diameter and up to 2 in. in length. The cell designed for the smaller cores uses a commercial micrometer. However, for the cell used with the 1½-in.-diameter cores it was necessary to make the micrometer to specifications, because the mercury level is raised over 1 in. (the range of commercial micrometers) by submersion of the large-diameter samples. The stainless-steel tip attached to the micrometer screw should be centric with the outside diameter of the micrometer-screw probe.

The transfer tube (4) should be constructed so that no air is trapped in the connections between it and the two vertical barrels. The internal diameter of the tube should be small (about ⅛ in.) to damp the surging of the mercury from one barrel to the other when it is disturbed by the insertion of a core.

Precautions in Use

Better results are obtained if the instrument is drained at the end of each day of use and Cylinder 2 is wiped clean with cloth or tissue paper. Cylinder 1 does not require cleaning so often.

When in use, the cell should be placed on a surface free from vibration to prevent movement in the surface of the mercury.

As the bulk-volume measurement depends only on the difference in heights of the mercury column before and after the test specimen is submerged, it is independent of the temperature at which the measurement is made as long as the temperature remains reasonably constant. When the temperature of the sample and mercury are changing rapidly, however, the readings will be found to be erratic and difficult to duplicate.

Operation

The procedure for using the apparatus is simple. Mercury is poured into cylinder (2) (Fig. 1), until contact between the mercury and the micrometer-screw probe (7) is made at a micrometer reading of approximately zero. The cap is placed on cylinder (2), the mercury level is located accurately with the micrometer screw as indicated by the electric eye, and the micrometer is read, estimating to the nearest 0.0001 in. A core then is submerged in the mercury in cylinder (20), using the wire probe (10), the mercury level is located again with the micrometer screw, and the micrometer is read. In each instance the micrometer-screw probe is raised above the mercury surface and the micrometer reading at the point of first contact with the mercury as the probe is lowered into the cylinder is observed. Because minute mercury particles cling to the surfaces of core samples when they are removed from the instrument, the mercury level should be measured before each determination.

The bulk volume of the sample equals the rise in the mercury level times a constant. The calibration constant for each instrument is obtained by

TABLE 1—COMPARISON OF RESULTS OBTAINED BY TWO ANALYSTS USING LARGE CELL

Core No.	Core diameter, inches	Analyst 1: Bulk volume, average of 11 determinations, cc.	Analyst 1: Average deviation, per cent	Analyst 2: Bulk volume, average of 15 determinations, cc.	Analyst 2: Average deviation, per cent	Deviation between results, per cent
1	1½	56.554	0.08	56.555	0.08	Negligible
2	1½	42.612	.04	42.631	.05	0.04
3	1½	29.082	.12	29.089	.09	.03
4	1	22.250	.05	22.319	.08	.31
5	1	18.017	.11	18.067	.19	.28
6	1	14.313	.09	14.331	.16	.13

TABLE 2—COMPARISON OF RESULTS OBTAINED BY ELECTRONIC BULK-VOLUME APPARATUS AND BY MERCURY-PYCNOMETER METHOD

Core No.	Core diameter, inch	Electronic apparatus: Bulk volume, average of 12 determinations, cc.	Electronic apparatus: Average deviation, per cent	Mercury pycnometer: Bulk volume, average of 3 determinations, cc.	Mercury pycnometer: Average deviation, per cent	Deviation between methods, per cent
1	¾	7.791	0.30	7.804	0.03	0.17
2	¾	8.508	.13	8.523	.01	.22
3	¾	8.508	.15	8.539	.04	.39
4	¾	7.566	.17	7.589	.04	.30
5	¾	7.295	.16	7.300	.07	.07
6	Irregular	12.180	.19	12.187	.03	.06
7	Irregular	5.708	.22	5.708	.06	.00
8	Irregular	2.594	.20	2.599	Less than .01	.18

substituting stainless-steel cylinders of known volume for the core samples in the described procedure, measuring the rise of the mercury column, and dividing the known volume in cubic centimeters by the measured rise in inches of the mercury column.

Precision

The precision of the bulk-volume determinations made with this instrument is somewhat less than that obtained by the mercury-pycnometer method, in which the core sample is submerged in mercury in a specially designed pycnometer and the mercury displaced by the core is weighed. Designed originally for small core samples, this pycnometer method gives results reproducible to ± 0.1 per cent on cores of approximately 8 cc. volume. However, the pycnometer method is time consuming and, unless extreme accuracy is required, can well be discarded in favor of the greater speed and relatively high accuracy of the electronic device.

To test the reproducibility of bulk-volume values obtained with the newly developed apparatus, a series of measurements was made on several core samples by two operators under varying conditions. One of the operators was experienced and the other inexperienced. Table 1 shows the variations in bulk-volume measurements made on six core specimens. Analyst 1, who has made severel thousand bulk-volume measurements with the apparatus, made 11 determinations, and Analyst 2 made 15 determinations on each sample. The average values of the measurements made by each analyst, as well as the average deviation of the measurements, are shown. The values obtained by Analyst 2, who had just learned to operate the apparatus, differed by not more than 0.3 per cent from those obtained by the more experienced analyst. This close agreement of results obtained by two analysts having different amounts of experience indicates that the apparatus is relatively easy to operate.

Table 2 shows the relative precision of bulk-volume measurements made with the new device and with the mercury pycnometer. These data show that the mercury-pycnometer method is the more precise, but that agreement between results obtained with both methods is sufficiently close for most core-analysis work.

The need for cylinders of small diameter and precision finish in the cell is emphasized by a calculation showing the percentage error in the bulk volume introduced by a small error in the micrometer reading. As it is difficult to reproduce a reading of a contact point within 0.001 in., it is possible that each reading might be in error by this amount. Two readings are involved in each determination; and, if these 0.001-in. errors are additive, the total error would be 0.002 in. In a small cell having a factor of 13 cc. per inch rise in the mercury level, this error in reading the micrometer would cause an error of 0.026 cc. in the measured bulk volume of the specimen. On a specimen of 8 cc. volume (about ¾-in. diameter, by 1½-in. length) the error would be 0.32 per cent. On the other hand, if a larger cell having a factor of 39 cc. for each inch rise in the mercury level is used, the error of 0.002 in. in the micrometer readings would cause an error of 0.078 cc. in the measured bulk volume of the specimen. On a specimen of 60 cc. volume (about 1½-in. diameter by 2-in. length), this error would be 0.13 per cent. However, such a volume error would represent a percentage error of 0.98 per cent on a test specimen having a volume of only 8 cc.

With careful calibration, the micrometer screw could be marked to read directly the volume of the specimen. Thus, one calculation would be eliminated which would represent a substantial saving in time.

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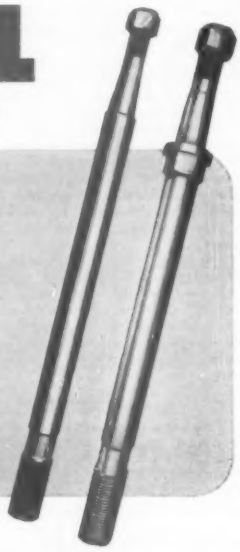
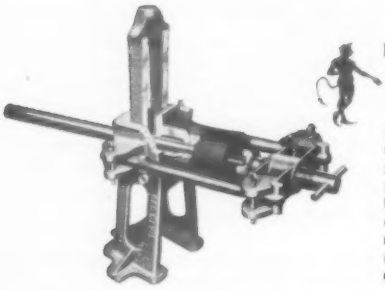
For high pressure abrasive service

RED DEVIL Piston Rods are first choice where drilling conditions are severest because of the extreme hardness of the deep HIGH-CARBON wear resistant "DIA-HARD" case, coupled with tough core properties which give the highest tensile strength against breakage. All rods are hardness tested and precision gauged to maintain a world-wide reputation for quality. Write for Catalog No. P-101.





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These "Hammer Lug Type" nuts provide a fast and positive means for locking piston rod in crosshead. Made from alloy steel and heat treated, they will last indefinitely. Face of nut is precision machined for full seating surface at right angles to axis of threads to prevent fatigue stresses in rod. Write for Catalog P-102.

Complete information in Composite Catalog or write for price catalogs noted above. Red Devil products are available through your supply store.

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Other Bonds and Warrants	11,610,121.46	$197,962,683.98
Loans and Discounts		54,836,220.48
Income Receivable Accrued		490,813.88
Stock in Federal Reserve Bank		240,000.00
Bank Premises		2,000,000.00
Customers' Liability Under Letters of Credit		188,282.91
TOTAL		$255,718,001.25

LIABILITIES

Deposits		$240,730,000.91
Letters of Credit Outstanding		188,282.91
Income Collected, Not Earned		230,201.40
Reserve for Taxes, Interest, Etc.		1,645,857.03
Dividends Declared*		150,000.00
Capital—Common	$ 3,000,000.00	
Surplus	5,000,000.00	
Undivided Profits & Reserves	4,773,659.00	12,773,659.00
TOTAL		$255,718,001.25

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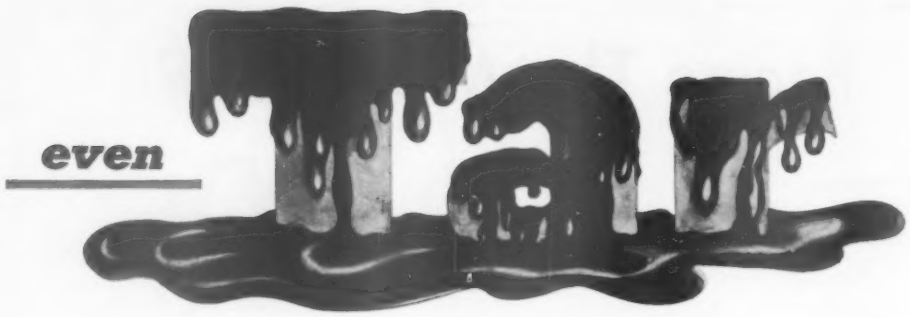

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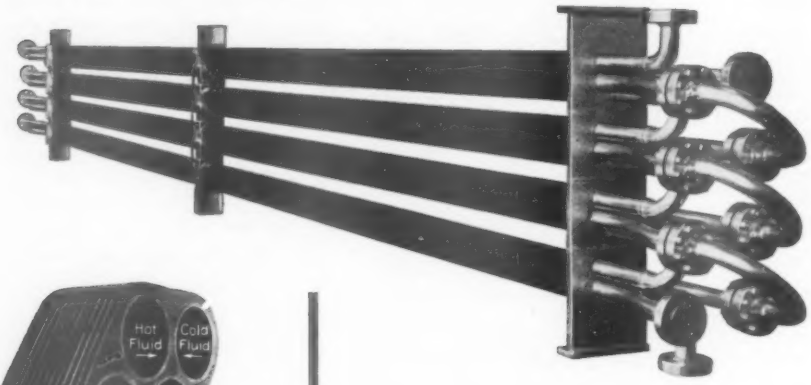

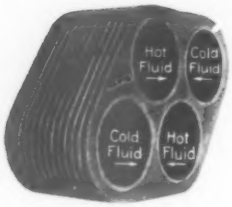

How the G-R Tubeflo Section Operates

The principle of design of the G-R Tubeflo Section is the arrangement of two pairs of large-diameter tubes expanded throughout their entire length into closely spaced diamond-shaped fins.

The cold fluid flows through one pair of tubes, and heat is transferred from the hot tubes to the cold tubes through the multiple fins. The design provides for continuous high velocity of the fluids.

Are you now letting the heat in hot tarry or dirty liquids go to waste? G-R Tubeflo Sections can recover this heat from cracking coil tar, shell still bottoms, tar bottoms, asphalt, and clay-bearing oils.

Are you having difficulty in heating heavy or extremely viscous materials? G-R Tubeflo Sections will handle crude oil, crude tar and feed stock without clogging.

These heat exchangers have proven their ability to maintain rated capacity on such services for more than 25 years, in installations totaling over 4,000 units, and at operating pressures up to 5,000 psi and temperatures up to 950F.

In many instances G-R Tubeflo Sections are operating with complete success on services which had necessitated shut down and cleaning of conventional units before the end of a run. Recommendations on their application to your difficult heat transfer operations will be sent without obligation.

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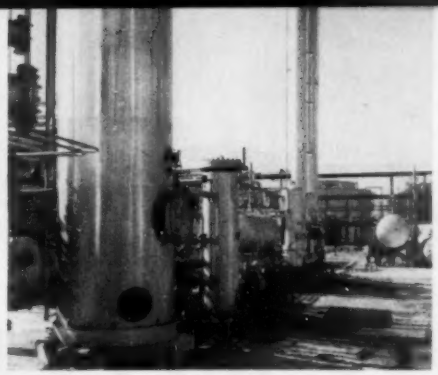
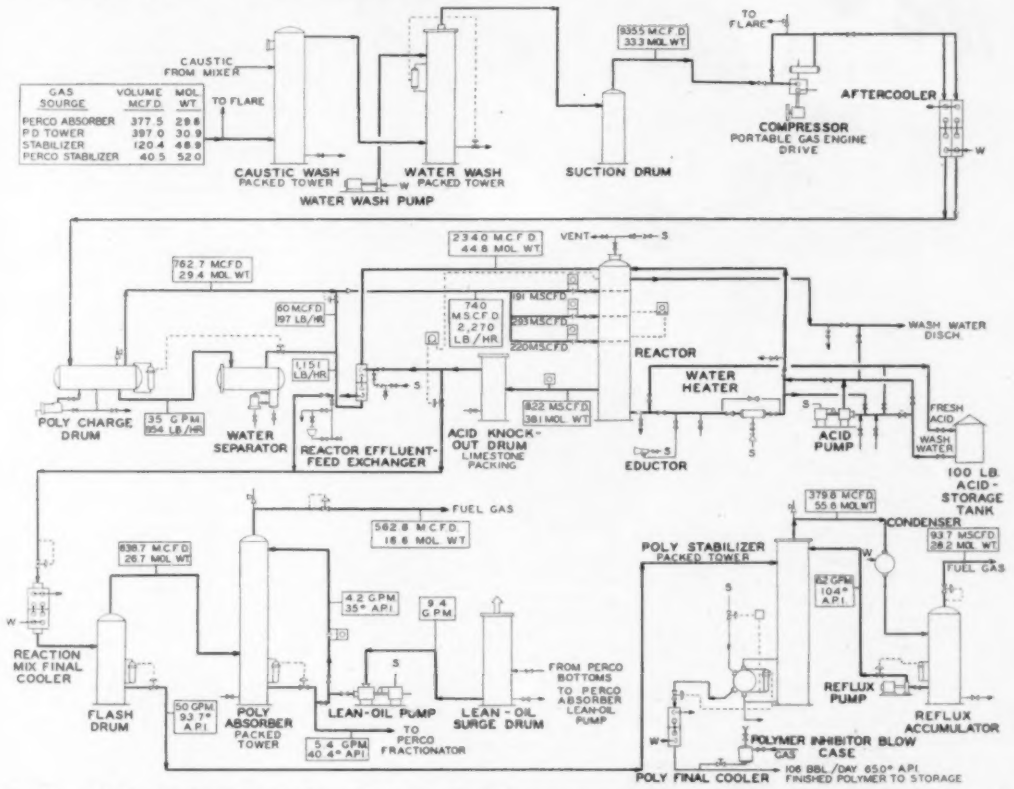
G-R HEAT TRANSFER APPARATUS **Tubeflo Sections**

GR 200



R. H. Tate, plant superintendent at Inland Refining Co., with poly unit in background. The reactor required an individual foundation, as seen in the photograph at right. Beyond the reactor are two skids, the nearer containing acid and liquid knockout drums and the farther containing reabsorber and stabilizer columns.



Flow layout of Inland's poly unit. Production rating on the unit, which processes gases from Perco and thermal cracking operations, is 100 bbl. per day.

Skid-Mounted Poly Unit Installed At Inland Refining Co. Plant

Unit is contained on four skids, plus the individual reactor

by F. Lawrence Resen
Gulf Coast District Editor

TYPICAL of refinery intallations which lend themselves especially well to skid mountings is the 100-bbl. per day poly unit at Inland Refining Co.'s Palestine, Tex., plant.

This unit and a Perco unit were prefabricated and mounted on skids in Houston and then moved in individual skid-mounted sections directly to the plant site were space had been previously cleared. With the exception of the large reactor of the poly unit, the

1500 clutches on the U-15

Three Twin Disc Friction Clutches are utilized to efficiently deliver the horsepower of each Unit Rig U-15. Twin Disc Hydraulic Disconnecting Couplings are also offered on engine compounds of new models.

In drilling literally millions of feet of hole, Unit Rig and Equipment Company's popular model U-15 Drilling Rig proves the dependability of Twin Disc Drives. The number of these Unit "work horse" Rigs in the field is approaching 500—with their power *effectively* put to work through Twin Disc Drives. All Unit Rigs of this basic design are equipped with three E or EH-218 Twin Disc Friction Clutches. And the latest versions have *additional* Twin Disc power linkage . . . are being offered with Twin Disc 21″ or 27″ HUD Hydraulic

Disconnecting Couplings on the engine compound.

Unit recently completed its 480th rig of the U-15 design, incorporating Twin Disc Drives. Such production testifies to the wide acceptance of this model . . . and of the nearly *1,500 Twin Disc Friction and Hydraulic Drives—on this model alone.*

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entire polymerization plant is mounted on skids.

Such items as the water wash and caustic wash towers along with necessary pumps and piping and heat exchangers were made up in Houston into compact sections. These were then set up in a dummy plant layout, the required piping between sections fabricated, and then the entire plant trucked to its location.

Unit design . . . The poly unit installed at Inland is of Standard of California design and is contained on four skids, plus the individual reactor. Three of the skids are arranged in a direct line, with the water wash tower, caustic wash tower, and water knockout drum on the end skid next to the reactor. On the succeeding skid are mounted acid knockout drum, liquid knockout, heat exchanger, and auxiliaries. The third skid in line contains accumulator, reboiler, and the reabsorber and stabilizer towers. A fourth skid is used for the unit compressor.

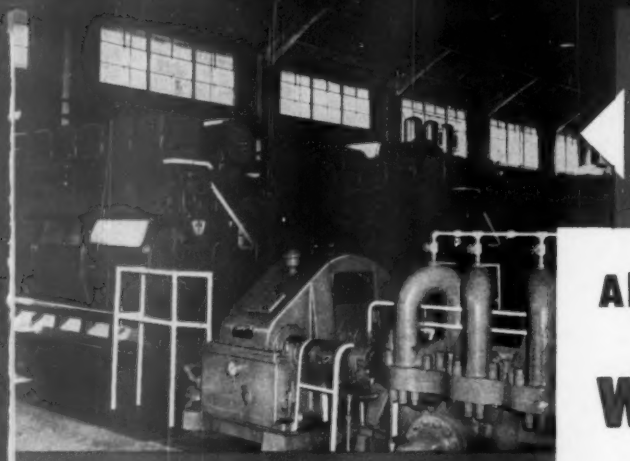
The unit at Inland receives the total mixed refinery gas stream, with no attempt made to separate olefins before the charge goes to the reactor. The gas charge is obtained from both the thermal cracking unit and the adjacent Perco unit on an approximate 50-50 basis. The 100-bbl. per day output of the poly unit is used for blending purposes to produce a 95-96 research octane number motor fuel with a 10-lb. R.v.p.

Process flow . . . Charge gas is scrubbed in a caustic wash drum and passed through a water wash drum to remove traces of caustic. The feed gas, amounting to approximately 900,000 cu. ft. per day is then compressed and passed to a charge drum where the stream is split so that overhead gas from the drum is charged directly to the reactor, while the drum-bottoms stream is passed through a water separator before reaching the reactor.

Polymer conversion takes place in the reacting vessel, with the bottoms going to an acid knockout drum and then on to a flash drum. Overhead from the flash drum is charged to a reabsorber, where lean oil picks up components in the stream for charging to the Perco fractionator. Fuel gas is taken overhead from the reabsorber.

Meanwhile, the flash drum bottoms are charged to the poly stabilizer column, from which finished polymer is recovered and sent to storage. Overhead from the stabilizer is condensed and used as reflux for the stabilization step.

Grebe & Doremus Process Co. designed, engineered, and constructed the poly unit.



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112-mile Richfield pipeline

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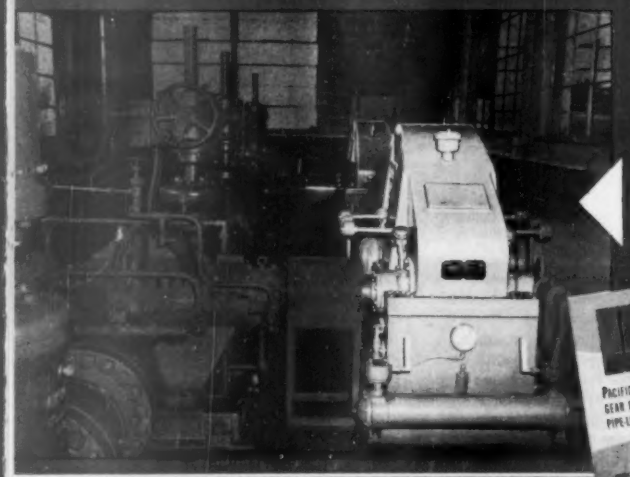

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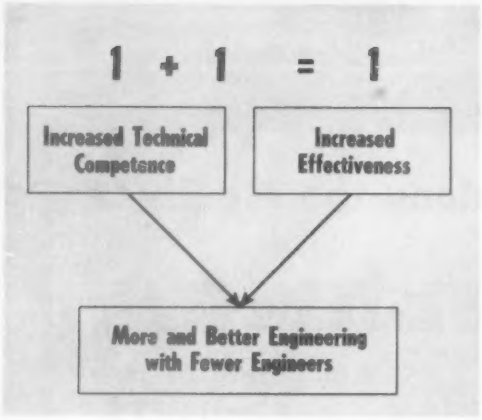

INCREASING EFFECTIVENESS OF ENGINEERS

A. **OFFICE AIDS**
- Adequate stenographic service
- Clerical service
- Minimum of reports
- Simplified reports

B. **FIELD AIDS**
- Trained aids for routine testing
- Trained aids for routine inspection
- Minimum of reports

C. **PROPER DIRECTION AND SUPERVISION**

D. **REPRESENTATION IN TOP MANAGEMENT**

JOURNAL REPORT ON . . .

How to Meet the Engineering Shortage

. . . Both engineers and management have a lot of work to do on this problem. Here is a special analysis and interview by The Oil and Gas Journal with Dr. Emory N. Kemler, noted petroleum-mechanical engineering educator and petroleum research director.

Q . . . How can the petroleum industry now better meet its pressing engineering requirements?

A . . . The recruiting of any sizable number of engineers during the next few years has all appearances of a very difficult problem. Under these conditions, industry can come nearest meeting its requirements by careful attention to policies which will insure keeping its present engineers and also to practices which will make the most effective use of them.

To the petroleum industry, which has an unusually high percentage of engineers and other technically trained personnel, this presents to its management a very critical problem. To competent engineers the situation presents the opportunity to receive better recognition for their contributions with resulting higher standing in the general company organization together with better remuneration.

Meeting the current shortage needs the cooperative effort of engineers and management. If management will encourage and back the engineers in these efforts, and if engineers will cooperate and take the initiative in this problem, sufficient relief can be obtained during this critical period to permit a progressive engineer program.

Q . . . Dr. Kemler, how serious is the current shortage of engineers available to the petroleum industry, and what is the outlook?

A . . . The current shortage of engineers together with the continuation of this shortage because of low engineering-school enrollments, is now receiving much publicity. Predictions vary but indicate the graduation of as few as 15,000 engineers in 1953 and 12,000 in 1954 of which the military (draft and R.O.T.C.) will absorb a considerable part. These engineers represent all branches and will have to meet the requirements of all industries in the country as well as governmental and military agencies.

Industrial requirements are estimated at a minimum of 30,000 with estimates as high as 60,000. As a basis of comparison note the figures in accompanying tables which show the number of graduates over the past few years.

Q . . . Can you recommend any one single plan or practice, as concerns better training and utilization of engineers?

A . . . Now is a good time for companies to look at past practices and make plans for the immediate future. Obviously, no one plan for recruiting, training, placement, advancement, or incentives will fit all situations for all companies.

Engineers as graduated from colleges represent a wide variety of abilities and fit into many types of work. In the petroleum industry where they may be employed by producing, transportation, or refining companies, a supply company, or a service organization, the engineers are utilized in many different ways. The types of work considered from a technical standpoint could be classified very broadly as research, engineering, sales, and operations. Men from many of these classifications advance into top-management positions. These top-management positions require, in addition to competence and experience, the ability to organize, supervise, and plan the activities of others.

Almost without exception, companies maintain some form of training program for the graduating engineer. This may be in the form of starting him off on a field, service, or shop assignment or a formal program providing for fixed amounts of time to be spent on various assignments over a period of 1 or 2 years.

When engineers are plentiful, this is an easy and a very sound way to introduce the engineer to company policies and industry practices, and to furnish an adequate background for helping him select the type of work in which he is interested and adapted.

ENGINEERING GRADUATES FROM ACCREDITED ENGINEERING COLLEGES

(From A.S.E.E. Journal and other sources)

Year	Undergraduate Degrees	Masters Degrees	Doctors Degrees
1954	*12,000-17,000		
1953	*15,000-20,000		
1952	*26,000		
1951	37,832	4,993	585
1950	48,793	4,705	492
1949	41,793	4,765	416
1948	27,460	4,289	250

*Estimated

RECOGNIZED MEANS OF INCREASING COMPETENCE OF ENGINEERS

I. PROFESSIONAL DEVELOPMENT
- Professional societies
- Trade associations

II. SELF-EDUCATION
- Individual study
- Trade magazines
- Professional magazines
- Correspondence-school courses

III. FORMAL EDUCATION
- Graduate work
- Night school
- Special courses
- Short courses
- Company conferences

IV. USE OF CONSULTANTS

Under conditions of shortages, training programs must be curtailed to a minimum and men have to be handled on an individual basis. The indoctrination time is reduced for those having summer experience or other factors which provide an earlier evaluation of individuals making them available for a specific responsible assignment at an earlier date.

Q . . . What, in your opinion, are the broad objectives of a college course and what does it accomplish?

A . . . Before discussing means by which an engineer's activities can be made more effective it might be well to consider broadly what a college course accomplishes. Perhaps the most significant thing is to provide a serious technical training while the individual is reaching an age of maturity where he can accept some degree of technical responsibility.

Most engineers receive a sufficiently broad training so they can adapt themselves to almost any engineering field by additional self-study.

Grades are generally used as a basis for companies in the selection of men. They may or may not be significant depending on the individual's background and interests. Some students make good grades because they follow instructions well or have a good memory, while others do poorly because they lack immediate incentive or interest. When given responsibility on the job the reactions of the individual may be quite different from those indicated by grades alone.

Q . . . Why are good placement and training methods necessary?

A . . . I feel that too many companies expect to get a trained and experienced engineer when they hire a man just graduating. What the average undergraduate accomplishes depends more on the training within a company than on his 4 or 5 years in college. Industry does not appreciate that colleges take immature boys they would use for errand boys, stockroom boys, etc., and in 4 years manage to give them some degree of professional training. By that time the boys have matured to some degree and have, in general, some sense of responsibility.

Everyone tries to push everything into the 4 years and few give consideration to the 40 years afterwards. Since few boys know what they want to do, let alone what they will do, a college training must necessarily be broad.

Q . . . What do you recommend to the oil companies about proper placement and postgraduation training of young engineers?

A . . . Proper placement and training after graduation is very important. Much attention and close study are given to the courses a student takes in his 4 or 5 years in school. Alumni and employers as well as the faculties have suggestions and ideas as to what should be given the student while in school.

Unfortunately, all give no attention or too little attention to the 40 or 50 years of the engineer after graduation. It is most unfortunate that the general concept of a sufficient and proper education is a 4-year college course cli-

The Author . . .

Dr. Emory N. Kemler, talking with The Oil and Gas Journal and its readers on these pages, is professor, department of mechanical engineering, Institute of Technology, University of Minnesota. He has a long record of distinguished engineering service in the petroleum industry—operations, research and colleges: University of Pittsburgh, Gulf Research & Development Corp., Gulf Oil Corp., Purdue University, Southern Research Institute, New York University, Southwest Research Institute, University of Minnesota. Dr. Kemler was born in Basehor, Kans., July 21, 1905. He attended University of Kansas, receiving the bachelor of science in mechanical engineering (1927) and mechanical engineering degrees (1932), and University of Pittsburgh, from which he received master of science (1931) and Ph.D. degrees (1934).

maxed with the presentation of a diploma. Too many consider it the end of all study whereas it should be the beginning. One phase of getting more engineering with fewer engineers is through encouragement of their professional and technical development.

The majority of graduate engineers go into operating work whether it be in the field, refinery or plant or in supervisory type of work associated with field or plant operations. The petroleum industry and industries which provide it with equipment utilize a large number of engineers for operating work. This is the result of the highly technical nature of its operations and the generally technical type of equipment supplied.

The problems associated with engineering placement for field and plant type of work are rather serious. These men need to have a better acquaintance with detailed field and plant practices than men who go into strictly engineering work. They also need to be very familiar with company practices, particularly those relating to personnel. Since these men will generally have responsibilities associated with the handling of men as well as equipment, it is imperative that they possess the ability to handle groups of men and develop the necessary experience to assure a satisfactory job for the particular type of operation under question. This means that technical achievements assume a secondary role to such items as actual experience and ability along the lines of handling men. Since experience can only be acquired through actual work over a considerable period of time it is obvious that those who ultimately go into operations must spend a longer period of time in the field or plant before they take over jobs of responsibility in connection with operations.

There is, therefore, present not only the problem of selection of men who have the proper capabilities in these directions but also the planning of a program which will give them proper experience prior to assigning them to jobs of even minor responsibility. Since sales personnel are so closely tied in with the personal contacting of individuals they likewise need to go through similar types of development programs.

Research

The selection of men for research activities is generally somewhat simplified since most of them are separately recruited and mostly from graduate students. Most of the research organizations realize that an undergraduate training provides only a minimum background and that for those who will go into highly technical work, additional training is necessary. As a result, larger companies send out recruiting groups who interview only graduate students for research and development jobs. Many of the engineering jobs fall somewhere in between research and operating group requirements. Some engineers, through professional and personal development, develop into excellent research men while others who have interests and abilities in the direction of operating work ultimately find themselves in that area of activity.

There is, therefore, no one pattern or method for locating or developing men for a particular activity. If training practices must of necessity be shortened to take up some of the slack as a result of the shortage of young engineers, frequent review of men in the operating and engineering groups must be made with the object of seeing whether the men have been properly placed on the basis of preliminary observations. In many cases it will prove desirable to shift a man from one type of work to another.

Q . . . Is there a "magic key" towards the making of a successful engineer?

A . . . The factors which contribute most to being a successful engineer can perhaps best be represented on a three-dimensional program. They can in a very broad sense be reduced to three factors: **(1) ability to get along with others; (2) hard work; and (3) professional competence.** The vector which represents the sum of man's ability in each of these areas is an indication of his probable technical success.

Outstanding ability in any one direction will carry him far, but obviously, ability in all will carry him further. The increased complexity of modern technology and operations requires greater emphasis on cooperative effort. Ability to work with others is important in technical problems, for operational or sales work it is a must. This ability to get along with and work harmoniously with others implies many personal characteristics such as professional integrity, a sense of social and moral responsibility, and good character.

Increasing the total effective output of engineers can be accomplished by increasing any one or all three of the general factors or characteristics indicated above. It is obvious that incentives in the form of promotions or salary increases can do much to encourage the engineer to increase his application to his work. Engineers in supervisory positions must make strong recommendations to management for rewarding those who produce and do more than just put in 40 hours per week. Management must act on such recommendations and also see that those in supervisory engineering positions are given proper incentives, both financial and opportunities to share in the broader management problem and in the establishing of general engineering policies.

The improvement of ability of people to work with and get along with others is the most difficult characteristic with which to cope. Improvement in this direction necessitates the setting of examples of cooperation and interest in performance of the individual engineers from top management down. It also requires the most patient guidance and help by the direct supervisor. Improvement of these characteristics is at best a slow process requiring the utmost of patience and diplomacy on the part of the direct supervisor at any level.

Q . . . We recently saw an instance in which an oil company which had just put up the motto, "More and better engineering with fewer engineers." What about this?

A . . . The accompanying chart indicates the avenues of accomplishing this present goal: More and Better Engineering with Fewer Engineers. These can be divided into two general classes; the first is methods of increasing the effectiveness of engineers, and the second is methods of improving their competence. Engineers have until recently been sufficiently plentiful and inexpensive that management has preferred to hire more engineers than concern itself with such problems as increasing their effectiveness or competence.

Small companies have depended

largely on their suppliers of equipment to do their engineering for them. Even some large companies have leaned heavily on the supply companies to help with some of their complex problems. With increasing shortage of engineers these sources of engineering help will become less available.

The positive approach to the solution of the problem is through methods to be discussed in greater detail. Engineers need carefully to analyze the items which would increase their effectiveness and competence and provide specific recommendations to management. Management must encourage such analysis and give engineers an opportunity to try out some of their ideas as well as providing an incentive to do such work.

Q... Dr. Kemler, from your own personal work, both in oil-field operations and in petroleum-research laboratories, will you detail some of the points concerning the subject of "professional development."

A... Some of the approaches to increasing technical competence of engineers are shown in the accompanying outline form. The petroleum industry has recognized the importance of continued training, particularly of field personnel. As a result, through the activities of the American Petroleum Institute, it has set up a number of courses whose objective is to familiarize the operating personnel with the new practices and new developments. These courses have been generally successful.

Another form of field-personnel development or training results from study of articles which have appeared in the trade magazines and in the technical press. The magazines serving the petroleum industry provide very complete coverage on new developments of interest both to field personnel and to engineers. In addition, they also carry much information relative to particular fields of activities. These more general and summary type of articles serve as a review and refresher course for men in the industry.

Q... What about help from consulting engineers?

A... Another method by which the competence of engineers can be increased is through the utilization of consultants in connection with special problems. Engineers as a group have not taken advantage of consultants to the extent of other professional groups, such as doctors and lawyers. In many cases, they spend a great deal of time developing information on a particular subject whereas this same information could be obtained from a consultant at smaller expense. The use of consultants is, in effect, an additional way of increasing the experience and scope of an engineering staff without carrying specialists continually on the payroll. In addition to accomplishing a certain job, they also do a certain amount of educational work and sometimes are of value even in going over and confirming the plans of the regular engineering staff.

Q... Let's get into your recommendations on how to increase effectiveness of engineers.

A... Some of the means of increasing the effectiveness of engineers are shown in the accompanying outline form. One method is through the provision of adequate office help. In many cases the addition of a stenographer and clerk for a group of four or five men will effectively increase the output more than the addition of two engineers. The extent to which this method can be applied depends on the type of work done but considered as an over-all problem the effectiveness of most engineering staffs can be increased by these means. There are many cases where the over-all output of an engineering staff is reduced because of excessive nontechnical duties. This can result in lost interest and enthusiasm. Stenographic and clerical services would do much to alleviate this condition.

Q... What's this, again, about trained assistants and secretarial help for engineers?

A... Trained aids to take care of routine tests and operational work can do much to increase the efficiency of an engineering staff, in the case of both field and plant personnel. While work of this type is excellent training for an engineer during normal periods, the utilization of aides without engineering training to take care of much of the routine work can extend the effectiveness of a field or plant organization. In many cases, these trained aides will do a better job than engineers. To the engineers it is merely a part of a training program, whereas to the trained aide it represents essentially a career.

The type of things that come within the work category for trained aids will vary greatly. In the case of oil-production work, an interested roustabout can often be developed to take over such duties as the making of dynamometer tests or bottom-hole-pressure measurements. In the case of certain types of inspection work, such as inspection for incipient failures whether it be in refining, pipe line, or production equipment, the inspection can often be handled by a trained man without an engineering education. This applies particularly to those types of inspections which are routine. In all of these cases there is no gainsaying that work of this type represents excellent training for the young engineers. However, the immediate problem is what to do about the impending shortage.

In connection with both central office and field engineering office work, the minimizing of report writing can give engineers additional time for other duties. There is, of course, a certain minimum of reports which must be prepared. In this connection, the attention to and simplification of reports is also worth while. There is always a tendency to keep adding items to reports and none are ever left off. Occasionally it is desirable to review the over-all situation to see if they can be simplified and some of the items deleted.

Q... What has been your oil-industry experience as concerns "direction" or "supervision"? And which engineering problems come first, and which are second order?

A... Proper direction or supervision is most important in connection with increasing the effectiveness of engineers. As in all types of work, there are literally thousands of engineering problems which need attention. Careful consideration needs to be given to these, first from the standpoint of things which are most necessary to keep operations going, and secondly, from the standpoint of those which have both short and long-time influence on operating expenses and investments. There has, therefore, to be a continual review of engineering activity to see that attention is being focused on those items which will both currently and in the long run yield the most profitable results.

(Continued on page 109)

Frank Lindeman, Jr., manager, producing department, and board member of Stanolind Oil & Gas Co., tells Engineers H. E. Rowe, Jr., and R. P. Roe. . .

What Management Expects of Its Engineers

MANAGEMENT expects the engineer to be a competent, careful workman, constantly expanding the scope of his knowledge and interests. He is expected to take an active interest in civic affairs and to help in public-relations activities.

The engineer who fulfills these requirements, who becomes an integral working part of the business team, and who aids in the operation and promotion of his company, will himself someday be a part of management.

What the engineer expects . . . The responsibility of the engineer to management also involves the responsibility of management to its engineers. Considering this aspect first, we can assume that the engineer has a right to expect of management at least these four basic tenets:

1. Management should clearly outline and explain the problems given to the engineers for solution.

2. Management should insist that good communication channels are established both up and down the line.

3. Management should be open minded and carefully consider the facts and recommendations presented by its engineers.

4. Management should have its engineers doing engineering rather than clerical or other routine work.

Requisite qualifications . . . Management has a right to expect from its technically trained personnel the same personal qualifications considered desirable in any employe, whether he be technical or nontechnical. The following eight qualities of relatively equal importance, are particularly desirable in an engineer:

1. He must have a high degree of honesty and integrity.

2. He must possess the ability to work in a team.

3. He must demonstrate a capacity for care and attention to detail.

4. He must show initiative.

5. He must display tact and consideration for the opinions of others.

6. He must possess imagination and vision.

7. Absolutely essential is the ability and willingness to learn—to consider college not as the completion but as the beginning of his training.

8. He must possess the very essential element of judgment.

While these qualities are desirable in any employe, some of them are particularly important in engineers. Honesty and integrity are among the more important ones for two reasons.

1. Because technical work is beyond comprehension of many of the people who use its results, it is relatively easy to at least temporarily pass slipshod work as good work. Only the integrity of the engineer can guarantee the quality of his work. 2. Most engineers are entrusted with a great deal of confidential information that would be of value to competitors or outside investors. Violation of this trust will certainly put the guilty engineer's company at a disadvantage.

Imagination and vision are two other very important characteristics needed in engineers. The technical man's eye should always be on the far horizon, searching for something bigger, better, and more useful. He should question the procedures and routines that are accepted as standard and continually use his imagination and vision to spot problems where he can put his engineering knowledge to work to do a better job. Some individuals are naturally endowed with an "inquiring mind." Certainly this is a prerequisite of a good engineer.

Other Engineering Requisites

These are the personal qualifications that are essential in engineers, but there are other, perhaps less-tangible requisites that fall along purely engineering lines.

An engineer should strive, first of all, for technical proficiency. The basic element of engineering is the habit of using orderly and systematic methods of thought in approaching and solving technical problems. The practice of engineering is the successive investigation of individual technical problems. The desirable engineer is one who uses the engineering approach, an approach

that includes a number of steps. In order, these are the six steps involved . . .

. . . **The first step** is to develop a clear understanding of the problem, whether it is one submitted by management or one discovered and being investigated by the engineer on his own initiative.

. . . **The second step,** if more than one problem exists at a time, as is almost always the case, is quickly to determine the relative importance of each problem. The engineer must concentrate on the most critical problem first, and ultimately spend engineering effort on each problem commensurate with its importance. This requires that he exercise good judgment. A lack of practical sense or judgment is a failing common to many engineers.

. . . **Third,** having selected the problem, the engineer must collect all of the pertinent facts. There is probably nothing that will devaluate a piece of engineering work more, in the eyes of management, than to discover that the engineer has either overlooked or withheld certain factual data pertinent to a problem. It is the job of the engineer to present all of the pertinent data. It is not his prerogative to withhold information because it does not support his recommendation. It is inexcusable for the engineer to overlook available information that would have a bearing on the solution of a particular problem. In many cases the data available are really insufficient; however, the ability to overcome this obstacle is one of the tests of a successful engineer.

. . . **The fourth step** in the engineering approach is the analysis of the problem. The engineer should not forget that the sure way to progress lies in a positive approach to new ideas that are presented for study. Engineers are

Management Says:

"1. We should clearly outline, explain problems given our engineers for solution.

"2. We should insist on good communication channels both up, down the line.

"3. We should be open minded, consider carefully all facts and recommendations presented by our engineers.

"4. We should have our engineers doing just that and cut out the clerical or other routine work."

Engineers Say:

"1. We must have a high degree of honesty, integrity.

"2. We must have ability to work as a team.

"3. We must show a capacity for care, attention to detail, initiative.

"4. We must use tact and consider opinions of others.

"5. We should possess imagination, vision.

"6. We must have ability and willingness to learn.

"7. We should consider college the beginning of our training.

"8. We must possess the element of good judgment."

too often the doubters and the conservatists. When asked his opinion of an idea that is completely opposite to established practice, he is inclined to think, first, of all the reasons why the idea is impractical. Having thus convinced himself that it is impractical, he contributes too little imagination to make it work, and then kills it with a negative recommendation. The engineer should approach each problem with an open mind and a broader point of view than his own personal interest. This will enable him to develop several alternate plans of solving it or of making a revolutionary idea work.

. . . The fifth step, logically, is to submit the recommendation to management. Once all the facts have been weighed, a certain amount of judgment must enter into the engineer's final recommendation. In part, this judgment derives from experience in solving engineering problems. Partly, too, judgment can be developed by performing "postmortems" on old problems of a similar nature where a satisfactory solution was achieved. In making his recommendation, the engineer should submit it in clear, concise form, together with all feasible alternate plans. He must also be careful to point out where he had to rely on assumed conditions as contrasted with accurate data.

If engineers as a professional group are subject to any over-all criticism, it is their general inability properly to express ideas, either orally or in writing.

Few indeed are the technical men who can explain a complex problem in language that the average lay person can understand. As it happens, many people who rely on engineering work are not themselves technically trained. Perhaps for this reason, they are also frequently inclined to be skeptical of the engineer's opinions, and must be convinced. It will be easier to bring about understanding and agreement if engineering reports are presented in simplified form.

Most engineering work must be reported in writing to those who are interested, but frequently, because it saves time, engineers are asked to present the results of their work orally. If technical matter is difficult to follow in writing, it is doubly hard to follow in discussion. Thus it goes without saying that an engineer's success depends as much upon his ability to write and speak clearly as on his knowledge of engineering subjects.

. . . The sixth step involves following through to determine whether the recommendation is adopted by management, and the final success or failure of the plan followed. If the plan failed, an analysis should be made so that the causes of failure become known and will not be repeated in future work on similar problems.

These six points—a clear understanding of the problem, relative importance of the problem, collection of the facts, analysis, recommendation, and followup—are the things expected of the engineer along technical lines.

Continuing Education

If he can perform capably in these respects, he is a satisfactory employe from the standpoint of carrying out his day-to-day technical assignments. The chances are, however, that he will not progress very far nor very fast unless he is willing to do more than his routine work.

The engineer must be a student throughout his entire career. He must continue to broaden himself not only in his own field but in others as well. He must read technical books and current literature to keep up to date. He should take advantage of whatever training may be offered to him. In short, he should respond to every opportunity to make himself a more valuable employe—not only as a means of benefiting his company's operations but also from the more selfish standpoint of preparing himself for advancement.

Part of this development involves acquiring abilities and interests beyond the strict boundaries of technical work. The engineer must continually broaden his outlook to see beyond his own immediate activities. He is an excellent planner as far as he goes. He is generally expected to arrive at his recommendation on the basis of the best results at the lowest cost. His immediate responsibility, and usually, his interest, end there.

The engineer properly leaves to other departments or outside consultants the questions of the effect of existing laws or future legislation, possible tax complications, supervisory and personnel problems involved, means of financing and the long-range economic outlook. However, unless a man in his work as an engineer has some understanding of the effect of legislation, taxes, marketing, personnel problems and so forth, he is not able to give proper consideration to all aspects of his problem. The engineer should seek the opinions of those in other departments that are affected—both from the standpoint of better job performance and from that of self-development.

The engineer is a part of the business organization. Initially, his whole duty is to give sound advice on engineering matters, thus aiding management in making sound decisions. To do this adequately, he must appreciate the business significance of engineering answers and be able to present his work so that the business significance is understood by management. He is also expected to be interested in management problems. Engineers —an d nontechnical employes as well, for that matter—who do not understand the aims of management, cannot intelligently pursue those aims and fulfill their obligation to management.

Planners of new ideas . . . It has been said that the top executives of an organization must be the planners and creators of new ideas, and that the task of the rest of the group is to carry out these plans. However, when ideas of a technical nature are concerned, the opposite is true. The principal flow of ideas of this type should be from the staff to the management. Management cannot concern itself with ponderous detail. Its time is too limited and too valuable. But management, by virtue of its experience and its vantage point of knowledge of the over-all picture, is in the best position to make broad decisions, and to satisfy itself that all possible approaches have been considered.

Management is also the proper agency to supply the conservative touch wherever necessary. Staff people, and particularly engineers, are the ones who should suggest the unusual and the unconventional. But staff people can do a better job if they are well acquainted with the policies, objectives, and over-all operations of the company. It is also well to bear in mind that engineers represent a growing source of executive talent. A recent survey by Fortune magazine showed that nearly 11 per cent of 900 top executives in American business came up through engineering ranks. Undoubtedly this proportion will increase steadily in the future. For his own benefit, the engineer will do well to prepare himself as fully as he can for possible succession to an executive job.

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How to Meet the Engineering Shortage

(Continued from page 105)

The attention focus in the case of research work should be, of necessity, divided between items of long-range and short-range interest. Because of the long period which experience has shown exists between the time when fundamental or general studies are initiated and practical results are developed, it is necessary that such work be started several years in advance of the anticipated need. The review of engineering projects by the supervisor and the guidance of engineers working on various projects, therefore, constitutes a most important avenue for increasing the effectiveness of the over-all engineering organization. This requires not only technical background but appreciation of some of the practical factors involved, since there are times when certain very minor problems create difficulties of a psychological as well as a nuisance value which justifies their solution.

Q. . . Should engineering have a place in top management?

A. . . Engineering work has had a record of continual increase in importance in the petroleum and related industries. During the past 30 or 40 years, engineers have advanced professionally in the industry from a position of a very subordinate nature to one of very critical importance. With this advance has been the recognition by many companies of giving engineers the place in top management comparable with that of such groups as financial, legal, operating, and purchasing.

By having a representative in top management, which in a large corporation may be a vice president in charge of engineering, the effectiveness of engineers can be greatly increased. Their reports, instead of having to be written in a form which can be read and understood by a lawyer or accountant, can in many cases be written in more technical form. The engineering representative in top management can then pass on the technical competence and worthiness of the project and, if necessary, supply the degree of interpretation required by other top-management staff. This has important influence in reducing in many cases the amount of report writing required.

In addition to all of these factors there is the morale factor. By having a representative in top management the engineering group would have a greater incentive and higher objective for which to work. This giving of the engineering activities greater recognition would result in improvement in the quality of engineering work and overcome some of the tendency of good engineers to transfer to operating work because of its greater financial attractiveness.

Q. . . Does the petroleum industry recognize the value of additional training at all levels?

A. . . It has used training methods at the field level but not at the professional level. It is equally necessary and important at all levels. During the past few years it has recognized its importance at the top levels, and many companies send their executives out for a 3 to 6 months specialized course.

For the engineers who serve both in research and engineering capacity there are several avenues available for professional development. One of these is through activities in professional societies and trade associations. Here again the activities in these societies provide means for keeping engineers up to date on new developments and for discussing general problems on a professional basis. Other activities on a trade association basis such as American Petroleum Institute also contribute to the general professional development of individuals through standardization activities as well as discussion of professional problems.

Another means by which the competence of engineers can be increased is through more formal types of education. In large industrial areas where night-school work is available or where some graduate work is available during the daytime, instruction can be obtained on an individual basis. As a general rule, however, such work is not available except, perhaps, to those in research laboratories, most of which are located in larger industrial cities.

On a practical basis, most engineers acquire information in special areas through self-study, professional-society activities, and contact with other engineers over a considerable period of time. During periods of shortage, the effect of the shortage can be reduced appreciably through speeded-up methods, that is, giving the men working on specialized subjects concentrated instruction on areas of their immediate concern. This can be accomplished through company conferences or through short courses given by educational institutions.

Company conferences work very well where company staff is available and where treatment of confidential company information may be a factor. The utilization of short courses, however, deserves careful consideration at all times. This is particularly true of certain types of activities which may involve laboratory or experimental techniques in which case the experience and technique can be obtained more efficiently under guidance than by an individual working on his own.

ENGINEER'S DUTIES vary widely. At left, Ed Woodall, junior petroleum engineer for Stanolind in East Velma field, Oklahoma, runs survey for a road. Right: Woodall tightens stuffingbox on a lubricator, while running bottom-hole pressure tests.

JOURNAL REPORT: How Texas Railroad Commission Operates; Its Rules, Regulations

3. PIPE-LINE MOVEMENT OF CRUDE OIL

Continuation article in this Journal series. No. 1 was on "Drilling-Producing Regulations of Texas Railroad Commission" (November 24, 1952 issue). No. 2 was "Gas-Well Potentials and Gas Allowables" (January 12, 1953 issue).

by Roy F. Carlson
West Texas District Editor

MOVEMENT of crude oil throughout the State of Texas, and from Texas to neighboring states is watched closely. A series of rules and later special orders have been set up by the Railroad Commission to follow and regulate such crude movement, particularly of oil that is produced within the State of Texas.

The 20 rules that have been adopted set up the conditions which transporters of crude must meet with regard to charges, claims, tariffs, and measurement specifications of pipe-line crude. These rules have been set up specifically for pipe lines to regulate them in a manner prescribed by State-wide Rule No. 36, which rule requires that pipe lines secure a permit to operate or to continue to operate each 12 months.

Rule 36 requires that no pipe line or gathering system, whether a common carrier or not, shall be used to transport oil or gas from any tract of land within the State of Texas without a permit from the Railroad Commission of Texas. This permit is granted after examination of the application of a pipe line to operate or continue to operate. This application must show that the line is so equipped and managed as to reduce to a minimum the possibility of waste and that it will be operated in accordance with the conservation laws and rules and regulations of the Railroad Commission.

The permit to operate is revocable at any time after hearing on 10 days' notice, if any line is adjudged so unsafe or so improperly equipped or managed as to be likely to cause waste. Five days' notice is given a pipe line to correct such unsafe condition, however. The permit may also be revoked if the line is violating the laws governing production, transportation, processing, refining, treating, and/or marketing in the State of Texas.

20 Different Rules Effective

Once given the permit to operate, pipe lines must adhere to the 20 rules established for regulation of such operation. The first of the rules defines marketable oil as any crude petroleum adapted to a refining or fuel purpose containing not more than 2 per cent b.s. and w. above a point 6 in. below the pipe-line connection with a storage tank. It also says that pipe lines shall receive all oil tendered by shippers, provided that the pipe line does not have to take oil from any one shipper exceeding 3,000 bbl. per day, and provided the oil is not materially different from other oil in the field. If it is so different, terms must be reached by shipper and carrier.

Rule 2. Basic sediment and water is defined and tests of such b.s. and w. content are authorized to be made by the pipe line under Rule 2. The measurement should be made on an average sample of the oil from a tank using a centrifuge or other device agreed upon by the pipe line and the tenderer of the oil. Oil at a temperature higher than 90° F. need not be accepted for

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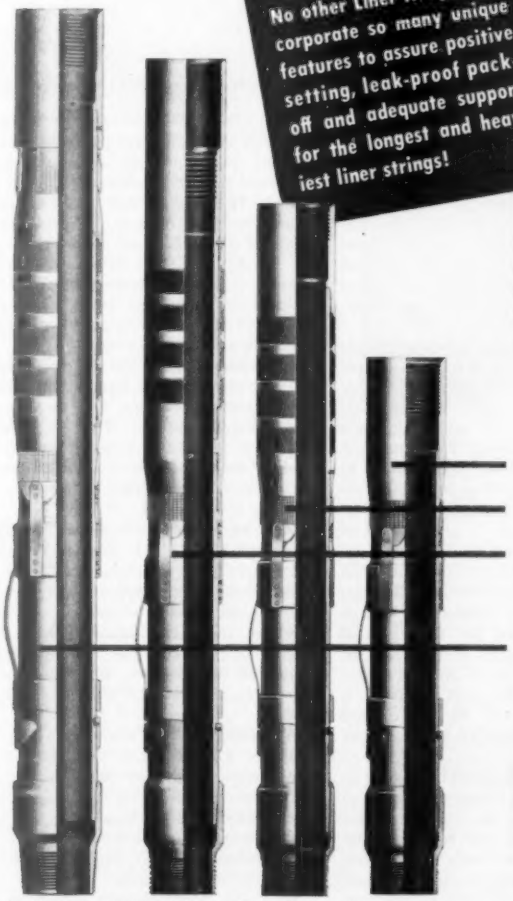

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APPLICATION FOR PERMIT TO OPERATE OR CONTINUE TO OPERATE
LINES IN TEXAS
RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION
RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION
RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

Typical of the forms used by the Texas Railroad Commission are these portrayed here. Adequate records are necessary for proper compilation of information to enable the commission to make sound regulatory decisions.

shipment except during summer months when it may be at atmospheric temperature. The receiver of the oil may make like tests upon receipt of the oil from the pipe line.

Rule 3. The standard measurement for oil is set at 1 bbl. of 42 U.S. gallons at 62° F.

Rule 4 provides that the pipe line may require an indemnity bond for its own protection if the shipped oil is involved in litigation.

By Rule 5 the pipe line is required to maintain sufficient storage without charge as is necessary to the transportation of the oil. At least 5 days is considered necessary at the pipe-line destination.

According to Rule 6, either identical oil or oil from stock of like character and market value may be delivered by the pipe line to the consignee.

According to Rule 7, the pipe line shall require not less than one tank-car load of oil when tendered for loading into tank cars at the pipe-line destination. When tendered for other transportation, the pipe line shall not be required to receive less than 500 bbl.

Rule 8 requires that tariffs to be charged by the pipe line be filed, and that these shall specify separate charges for gathering, for transportation, and for the delivery of the oil.

Rule 9. All oil received by the pipe line must be gaged by the pipe line before receipt from the shipper, and the shipper or his representative shall have the privilege of being present during such measurement. Rule 9 further states that quantities gaged should be measured according to 100 per cent tank tables at 60° F. The pipe line is also authorized to deduct for b.s. and w. content and to deduct 1 per cent for evaporation losses and losses during transportation.

According to Rule 10, the pipe line shall transport oil with reasonable diligence, but may after 24 hours' notice to the consignee after receipt of a consignment of oil, tender this oil for delivery from its common stock at point of destination, conformable to Rule 6, at a rate not exceeding 10,000 bbl. per day. Computation of time of storage, as in Rule 5, shall begin at expiration of such notice. At the expiration of such time allowed in Rule 5, for storage at destination, the pipe line may assess a demurrage charge on all oil tendered for delivery and remaining undelivered at the rate, for the first 10 days, of 0.1 cent per barrel per day, during the next 10 days at the rate of 0.2 cent per barrel, and thereafter at a rate of 0.3 cent per barrel per day.

By Rule 11, the pipe line is given the right to have a lien on all oil to cover charges for transportation, including demurrage, and may withhold delivery of oil until such charges are paid. If such charges remain unpaid for more than 5 days after notice of readiness to deliver, the pipe line may sell the oil at public auction after 48 hours' published notice.

Rule 12 requires that a notice of claims for loss, damage, or delay of shipment of oil must be made in writing to the pipe line within 91 days after such incidents have occurred or in case of failure to make delivery within 91 days after reasonable time for delivery shall have elapsed.

According to Rule 13, shippers may use pipe-line private telephone, or telegraph without charge for messages incident to shipments. The pipe line shall not be held responsible for delivery of messages away from its office, for delay in transmission, or for interruptions in service.

Rule 14. When a consignment of oil is accepted, the pipe line shall give the shipper a run ticket and shall thereafter render to the shipper a statement which shall show the amount of oil received for transmission, place of origin and destination, corrections made for temperature, deductions for impurities, and rate for such transportation.

According to Rule 15, when a shipment of oil has been tendered for transportation, the pipe line shall have the right to go upon the premises where such oil is produced and stored and have access to all storage facilities for examination, tests, and inspection authorized by these rules.

Rule 16. When tenders are in ex-

cess of facilities, transportation capacity shall be apportioned among the shippers in proportion to the amounts tendered by each. This is provided that no tender shall be considered beyond the amount which the party requesting shipment, then has on hand accessible to and ready for shipment by the pipe line. The pipe line shall be considered as a shipper of oil produced or purchased by itself and held for shipment through its lines and its oil shall be considered in such apportionment.

Through Rule 17, pipe lines are required to provide necessary connections and facilities for exchange of tonnage at every locality reached by two or more pipe lines when the Railroad Commission finds that such connections are necessary.

Rule 18, in addition, states that the pipe line shall provide facilities for receipt and delivery of crude at other points where the Railroad Commission finds necessary.

Rule 19. This rule provides that all loss of oil through fire breaks, or leaks must be reported to the commission.

Rule 20 requires posting of these rules by the pipe-line companies.

Other supplemental orders have been issued by the commission from time to time since the issuance of the above rules, some of these requiring submission of reports to the commission. Included is a report containing the number and location of receiving and delivery stations used by the pipe line, the amount of crude gathered by each receiving station and run, the number of barrels of crude transported by the pipe line for itself and others separately, the number of barrels delivered, to whom, and where. Another report required recounts the amount of tankage belonging to the pipe line that is available for storage, the number of barrels of crude in storage, and the amount of unfilled storage of the carrier. These two reports are filed on or before the fifteenth of each month covering the month immediately preceding.

The pipe line must file an annual financial report with the Railroad Commission, and must also file copies of tariffs.

Copies of oil tenders must be filed with the commission also.

The first tender, SW-1, is filed by the producer and authorizes the pipe line to gather crude taken from the producer's property.

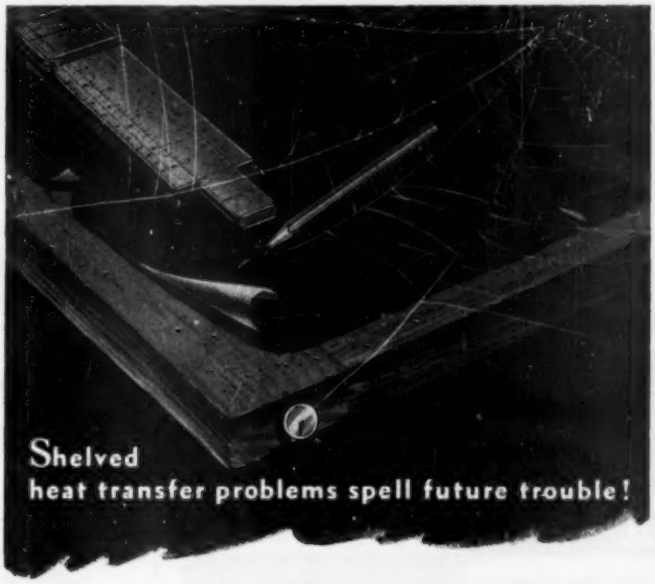
The second tender, SW-2, is a forecast tender. This report must be filed on or before the tenth day of each month during which oil is to be run. It is filed in triplicate with the office of the deputy supervisor of the district in which the crude is produced, and is there registered and given a serial number. A supplemental tender may be filed later in the month to cover changes in allowables, new production, or abandonments. This report is required to show that only allowable oil is being run.

The third tender, SW-3, is filed for each change of ownership of oil transported within or from the State of Texas. Four duplicate originals must be filed. The copies of the tender are registered in the proper commission office, and this registration number must be used in delivering oil to another transported other than a pipe line. Oil shipped into Texas from another state must be shown to have been produced in accordance with the laws of the state from which it is imported, the point of origin of the shipment, its destination, means of transporting, and other identifying data.

A person or company receiving oil from various sources which is mixed into common stock shall account for oil taken therefrom on combined form **ED-1** and **SW-6,** to support amounts given on delivery tenders. This report is filed on or before the tenth of each month.

Any tender approved through fraud

(Continued on page 122)



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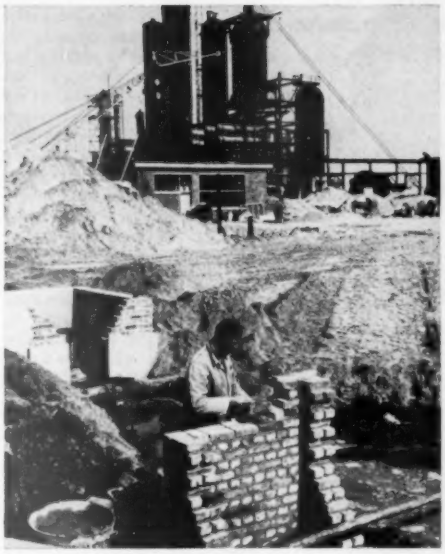


Mason at work on foundations of a valve box on the site of the Esso Standard refinery at Antwerp.

Belgian mechanics adjusting an electrical motor to a centrifugal pump at Esso Standard refinery.

New Antwerp Refinery Designed to Process Middle East Crude for Prime Fuel Products

Combination unit eliminates many major equipment items from the more conventional processing sequence through use of new techniques and by integrating the processes

THE latest design in fluid catalytic cracking and SO_2 treating together with the unique features of the combination unit are featured in the new Antwerp, Belgium, refinery of Esso Standard Refinery, S.A., an affiliate of Standard Oil Co. (N. J.).

The refinery is designed to process Middle East crude for prime fuel products such as gasoline, kerosine, diesel fuels, and light and heavy fuel oils. Engineered by Standard Oil Development Co. with construction by Lummus, the 27,000-bbl. per stream day refinery is scheduled to go on stream early this year.

In view of the interest of the Benelux area in local refining to reduce dollar requirements for petroleum products, a study was made of the economics of refinery construction in that area to meet the product requirements of Jersey Standard's affiliated marketing companies. This study showed that a refinery of approximately 25,000 bbl. per day could be expected to operate economically.

After considering the economic situation, transportation factors, and availability of satisfactory sites, it was decided to locate such a unit at Antwerp. In negotiations with the city of Antwerp, a long-term lease was obtained on the present site. Located between the Schelde River and the Hansadok Canal approximately 4 miles northwest of Antwerp, the refinery site includes 205 acres of which 115 are being utilized at present.

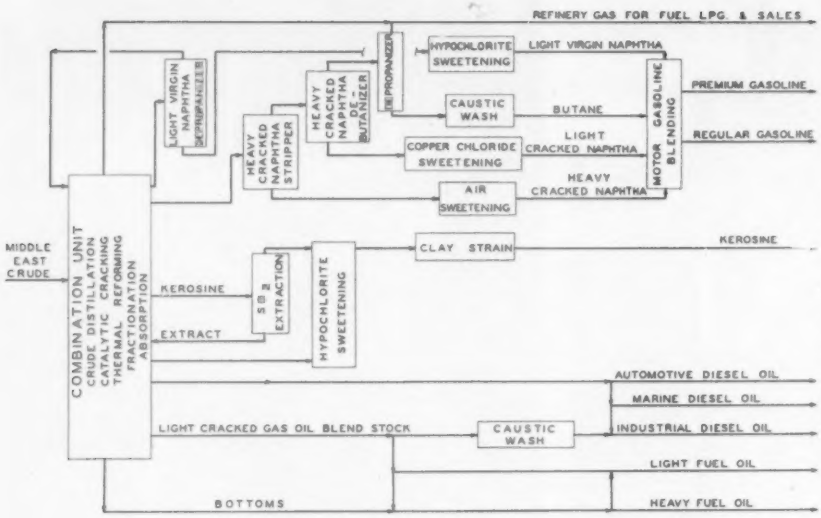
Approximately 2,140,000 cu. m. (2,799,000 cu. yd.) of sand fill dredged from the newly constructed Petroleum Basin were used to raise the refinery level to the required elevation. The refinery layout has been specifically adapted to the area, harbor, and site conditions.

The Antwerp refinery has been designed on the basis of a new simplified processing technique recently developed by Standard Oil Development Co. A fuel-products refinery usually required a two-stage pipe still, a heavy-naphtha reforming unit, a fluid catalytic cracking unit, gas-compression facilities, and a naphtha stabilizer together with miscellaneous blending and treating facilities. Extensive intermediate storage between all these plants is also necessary. All these complexities are expensive.

The combination unit, through the use of new techniques and by combining and integrating processes, eliminates many major equipment items from the more conventional processing sequence. In addition to this simplification and the incorporation of a Model IV fluid catalytic cracking unit, other major cost reductions have been effected.

The concentration of the small number of major equipment pieces into a single block requires a minimum number of utility and process tie-ins. Refinery losses are cut due to the fewer processing steps. Many expensive sewers and roads are either completely eliminated or are greatly simplified.

Because of the compact arrangement, fewer operating personnel are required.



Flow diagram of the Antwerp refinery of Esso Standard.

This cost reduction and the improved operation greatly outweigh the reduction of flexibility inherent in a highly integrated unit. It is estimated that this unit will cost about 20 to 25 per cent less than a conventional refinery. In addition to lower investment cost, the combination unit is more economical to run than the multiple conventional plants.

The accompanying simplified flow plan illustrates process sequence. To cover clearly the operation of the refinery, it has been divided into sections as follows: crude distillation, naphtha reforming, catalytic cracking, fractionation and absorption, light-ends recovery, and product finishing.

Crude Distillation

Crude is fractionated in the crude pipe still into a light-naphtha overhead, three sidestreams, and a reduced-crude bottoms stream. This equipment has been designed to operate alternately with the No. 2 sidestream producing either kerosine or light diesel oil.

Crude from tankage, after being heated by exchange and the cabin-type crude heater, flows to the flash zone of the pipe still tower. The overhead light naphtha is pumped to the depropanizer and is stabilized. The depropanizer vapors are processed in the absorber for recovery of gasoline fractions and the depropanized virgin naphtha bottoms are pressured through a cooler to the sweetening unit.

Heavy naphtha is withdrawn as the first sidestream and is sent to the reformer furnace. During the kerosine operation, the No. 2 sidestream flows to the SO_2 extraction-unit feed tanks. For the diesel operation, this sidestream is sent to the light-diesel-oil blend tank.

The third sidestream withdrawn as a total drawoff is split into a reflux and a product stream. A portion of this product is diverted to the catalytic cracking unit as feed stock and the rest is line blended with the light diesel oil from tankage for the production of marine, automotive, and industrial diesel fuels. The pipe-still bottoms are steam stripped in the lower section of the tower.

Naphtha Reforming

The naphtha reformer furnace is designed to process heavy naphtha. The reformer vapors leave the coil outlet at 755 psig. and 1,105° F. and are discharged into the flash zone of a fractionating tower through a hand-controlled release valve.

Catalytic Cracking

The Model IV fluid catalytic cracking unit is a completely new type of unit incorporating the most recent engineering modifications designed by Standard Oil Development Co. The novel features of the Model IV unit include a catalyst circulation system which operates without slide valves, a much lower height of structure, a greatly simplified catalyst-recovery system, and the use of smaller vessels. Reduction in the order of 20 per cent in investment cost and the corresponding lowering of operating costs result.

Along with the reduced costs, the greatly simplified Model IV unit provides reduced maintenance and easier control with attendant reduced labor requirements at no sacrifice in safety of operation. Decreased catalyst attrition and further improvement in the wide flexibility of yields, conversions, operating temperatures and catalyst circulation rates inherent in fluid catalytic cracking units are accomplished in the Model IV unit.

The feed to the unit consists of a mixture of fresh and recycled gas oil. The unit will produce high-octane gasoline blending stock and diesel oil and light and heavy-oil components as well as fuel gas.

The hot feed at a preheat temperature of 600° F. is injected into the reactor inlet line where it is vaporized by mixing with a stream of hot catalyst from the regenerator. This mixture flows into the dense phase where the cracking reaction is completed. The reactor products leaving the dense bed are disengaged from the catalyst and pass through the reactor cyclones for further catalyst removal. The catalyst is returned to the dense bed and the relatively catalyst-free vapors are sent to the flash zone of the fractionator.

Spent catalyst is withdrawn from the reactor through the baffled internal steam stripper and flows to the regenerator through the spent-catalyst U-bend and dense-phase riser. The catalyst is reactivated in the regenerator by burning off the carbon laid down during the cracking process.

Combustion air is supplied by the primary air stream introduced through the auxiliary burner and by the dense phase riser air. This latter stream also controls the rate of catalyst withdrawal from the reactor to the regenerator. Total regeneration air amounts to 13,700 standard cubic feet per minute and is supplied by a motor-driven centrifugal blower. The regenerated catalyst is recirculated to the reactor through the regenerated catalyst U-bend and the oil injector.

Flue gases in the regenerator are disengaged from the dense bed and pass through cyclones to recover the majority of entrained catalyst. Some of the heat in the hot flue gases is recovered before being released to the atmosphere. Anticipated catalyst loss from the unit will be low despite the fact that neither precipitator nor slurry settler is provided.

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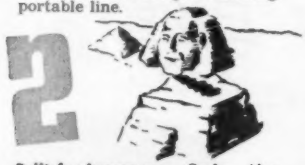

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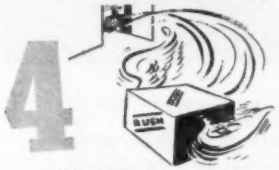

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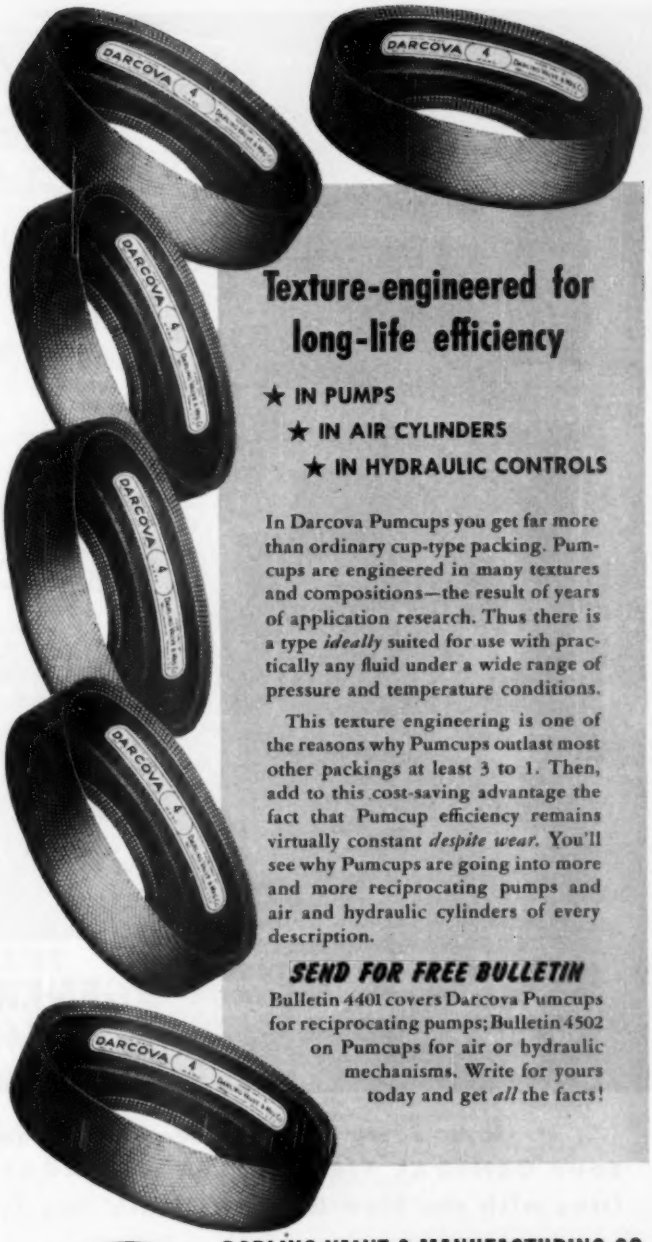

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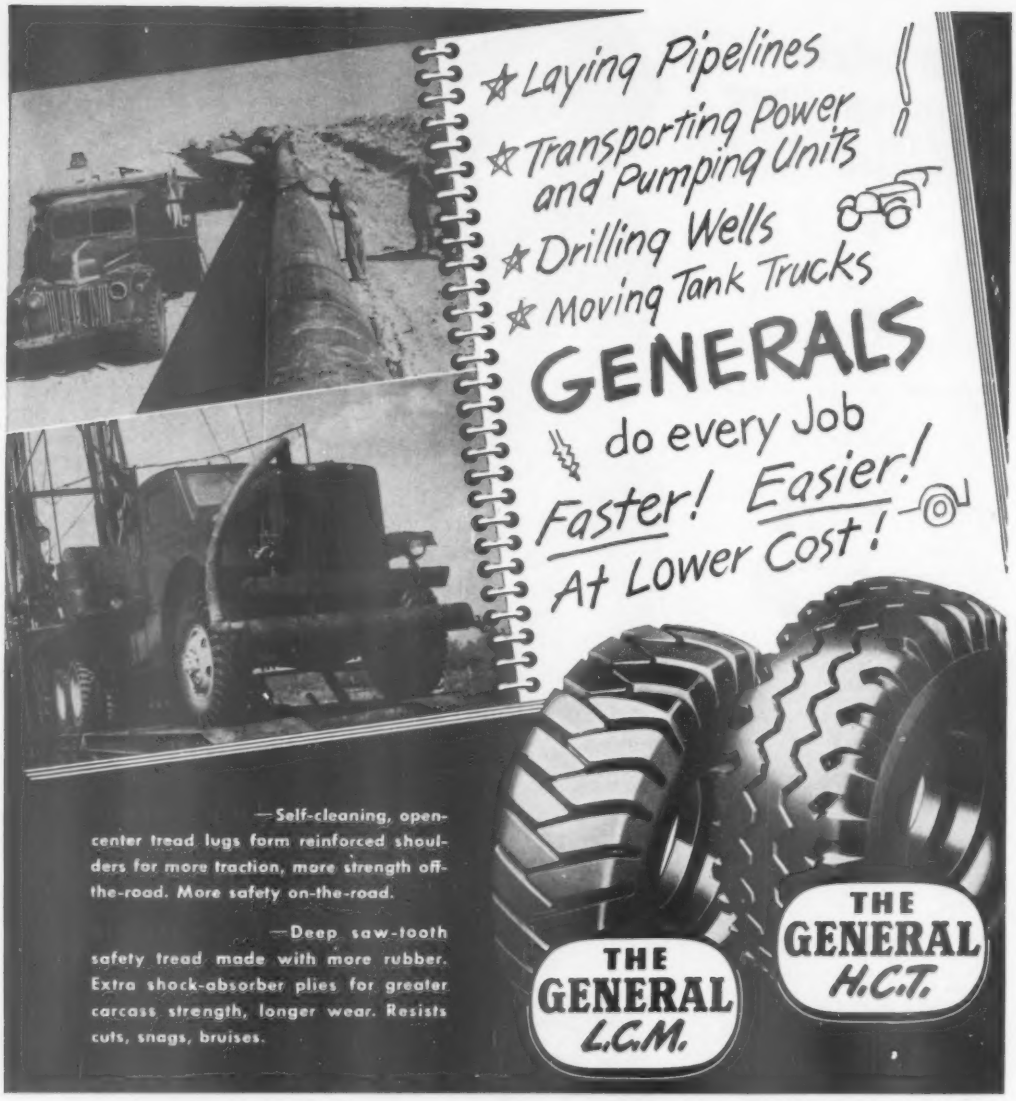
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Fractionation and Absorption

The fractionation and absorption sections of the combination unit process the vapor streams from the reformer furnace and the catalytic cracking unit reactor together with the overhead vapors from the light virgin naphtha stripper. Product streams of these operations include a heavy bottoms stream, light cracked gas-oil blend stock, a mixed naphtha stream, and dry gas. The bottoms are line blended with light cracked gas-oil blend stock to heavy-fuel-oil specifications.

This heavy fuel oil is pumped to product tankage with a portion being diverted for blending with additional light cracked gas oil to light-fuel-oil specifications. The remainder of the light cracked gas oil is caustic and water washed and then blended into the industrial diesel-oil product. The dry-gas stream is pressured to the refinery-fuel-gas system.

Light-Ends Recovery

The mixed naphtha stream from the combination unit fractionation section is pumped through heat exchange into the stripper. The stripped heavy naphtha is withdrawn from the bottom of the tower, cooled, and pressured to air sweetening for finishing. Overhead vapors from the stripper are partly condensed and fed to the debutanizer. The stabilized light naphtha flows from the debutanizer reboiler through a cooler to the copper chloride sweetening unit. A stream withdrawn from the debutanizer is pumped to the top of the stripper as reflux.

Overhead vapors from the debutanizer are totally condensed. Part of this stream is pumped to the top of the debutanizer tower as reflux and the rest is fed to the depropanizer tower. The depropanizer bottoms are cooled and sent to the caustic wash facilities at the sweetening unit. The overhead vapors are partially condensed with the liquid pumped back as reflux to the top of the tower and the uncondensed vapor discarded to the refinery-fuel-gas system.

Product Finishing

Two hypochlorite sweetening units are provided, one to process light virgin naphtha and the other to finish kerosine raffinate. Hypochlorite sweetening is employed to oxidize the mercaptan type of hydrocarbon to disulfides which are not objectionable from an odor standpoint. Undesirable reactions between the hydrocarbons and hypochlorite are minimized by using low-hypochlorite and high-caustic concentrations, short treating times, and treating temperatures of 100° F. or lower.

Sweetened products are water washed to remove any entrained sweetening solution, settled, and pumped to tankage. To assure a bright kerosine product, the water wash is followed by sand filtration to remove entrained water. The kerosine then passes through a clay finishing tower for odor, color, and wick-char improvement and final water-haze removal.

The light-cracked-naphtha copper chloride sweetening unit employs the conventional Linde process. The raw naphtha from the debutanizer is caustic and water washed to remove hydrogen sulfide. It is then sweetened by contacting with a clay-copper chloride slurry in the presence of oxygen. After water washing and drying, the finished naphtha is sent to storage. Since gum formation in cracked stocks is accelerated by the presence of some copper compounds, a metal deactivator is added to the sweetened naphtha before tankage.

Facilities for air sweetening the heavy cracked naphtha have been provided. This process removes aromatic mercaptan; residual hydrogen sulfide, phenols, and cresols, and a portion of the aliphatic mercaptans. Caustic and water-washed heavy naphtha from the stripper is contacted with dry air and sent to storage. The naphtha remains in tankage for a minimum of 2 days to complete the sweetening process.

The duty of the SO_2 extraction unit is to treat raw-virgin-kerosine distillate with liquid sulfur dioxide to produce

crude oil..purified by HONAN-CRANE

cuts diesel fuel cost

13.4%

This diesel power plant at Glencoe, Minnesota, using crude oil for fuel and employing Honan-Crane purification, saves $8,618 per year on fuel costs. For power plants, pumping stations and many other diesel operations the higher b.t.u. content and lower cost of crude oil are important advantages that can be utilized when Honan-Crane purification is employed. Honan-Crane purifiers remove all types of contamination . . . engines *run* cleaner, injection systems, pistons and liners *stay* cleaner. Savings in fuel costs are matched by reduced downtime and maintenance expense.

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a finished kerosine suitable for lighting. The primary function of SO_2 treating is to extract aromatic hydrocarbons which adversely affect the smoke point of lighting kerosine. Other effects of treating are reduction of sulfur and wick char.

Dried cold feed is contacted countercurrently with cold liquid SO_2. Two phases are formed, an upper raffinate phase containing paraffinic hydrocarbons and a lower phase of high aromatic content. The raffinate is stripped of solvent in an SO_2 recovery unit, caustic washed and pumped to the hypochlorite sweetening unit for further processing. The extract is similarly rendered SO_2 free and then fed to the combination unit for rerunning.

Offsites

The gasoline-blending facilities are designed to line blend premium and regular-grade motor gasolines. Blending sticks consist of light virgin naphtha, light and heavy cracked naphtha, and butane. After blending, the unit will finish the products by the continuous injection of sufficient additives to pass gum, stability, color, and octane specifications.

Facilities have been provided to minimize air and water pollution. A deodorizer will remove the odorous compounds present in all spent caustic streams and in the hydrogen sulfide-bearing water from the various distillate drums. A ground flare sized to handle the maximum gas make of 12.6 million standard cubic feet per stream day has been provided. A water spray system will reduce the flame size and luminosity and minimize the smoke. The refinery separator provides the facilities for the separation of oil and water from the clean and dirty water systems.

The electrical power used in the refinery is purchased from the city of Antwerp, and is supplied at 15,500 volts to the main refinery substation. Its steam requirements are supplied from three 30,000-lb.-per-hour boilers operating at a nominal pressure of 150 psig. and 450° F. total temperature at the superheater outlet. The boilers are of the multiple-drum, water-tube type with water-cooled furnace walls and floor. Weather-tight steel casings for outdoor installation have been provided. An elevated platform provides a common firing aisle which connects to the boiler control room.

Feed water is taken from the treated-water storage tank through the blowdown-feed water exchanger and the deaerating heater to the boilers. The water-treating system consists of two sodium zeolite softening units and a brine tank for regeneration.

The cooling water main pumping station takes suction from the Petroleum Basin. Two 10,500 g.p.m. cooling-water pumps of the motor-driven, vertical centrifugal type are provided. In addition, two 2,000-g.p.m. fire-water pumps have been installed. One pump is motor driven and the other gasoline-engine driven.

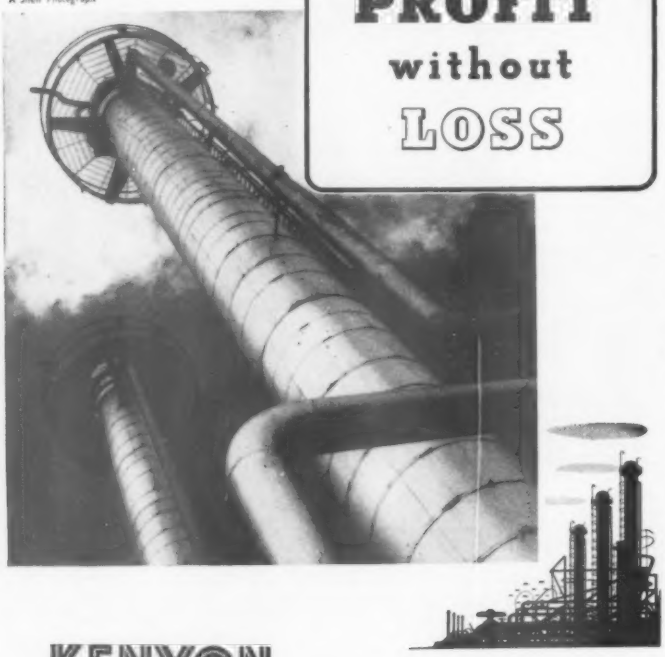
The plant is completely equipped with fire-fighting facilities.

The refinery has a total of 45 oil and 2 water tanks. Two tanks have been provided for each product to permit custom gaging of the tank from which deliveries are being made. Jet nozzles are provided on the inlet lines to the gasoline product tanks to prevent stratification of the blended product in the tank.

Products will be shipped by barge, tank truck, and tank car. Marine facilities include two tanker-unloading berths on the Hansadok and three barge-loading berths on the Petroleum Basin. All docking facilities are rented from the city of Antwerp. One of the tanker berths will handle the sale of fuel oil and marine diesel bunkers and the second the receipt of crude oil.

Two four-point tank-truck loading racks are located in the marketing area at the extreme northwest corner of the refinery site.

A Shell Photograph



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Kenyon provide a *complete* thermal insulation service to the oil industry, including technical advice on thermal insulation specifications, and finishes for all conditions. Supply of materials, application, supervision, on sites throughout the world.
The photograph shows Fractionating equipment on Distillation units at Shell Chemical Plant, Stanlow, Cheshire, England.

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KH 134

PEERLESS PROCESS PUMPS

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PEERLESS TYPE PR PROCESS PUMP HANDLES HOT OIL AT 750°F—*In continuous service with minimum of attention or maintenance*

The refinery report card on the Peerless Type PR pump shown above grades its performance as *EXCELLENT*. The refinery operating staff states that since installation it has met its prescribed performance requirements with no shutdowns, except for periodic routine maintenance. This kind of dependable operation can be obtained for your heavy duty refinery pumping service. Why not familiarize yourself with the details of these improved Peerless process pumps by mailing the coupon for a new bulletin which describes the outstanding modern design and construction features of Peerless Type PR center-line-mount process pumps.

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Capacities: up to 1000 gpm.

Operating Heads: up to 675 feet.

Temperatures: Type PR (Packing gland construction) up to 850°F; Type PRS (Mechanical Shaft Seal Construction) up to 250°F.

Case Pressures: up to 600 psi.

Drives: horizontal electric motor is standard; others as required, such as steam turbine drive or stationary engine drive.

Materials of Construction: Liquid end can be furnished in cast iron, bronze, carbon steel, stainless steel or other materials as required for intended service.

Liquids Handled: hot oil, hot water, propane, butane and all petroleum hydrocarbons, process liquors, dowtherm, and numerous organic solutions.

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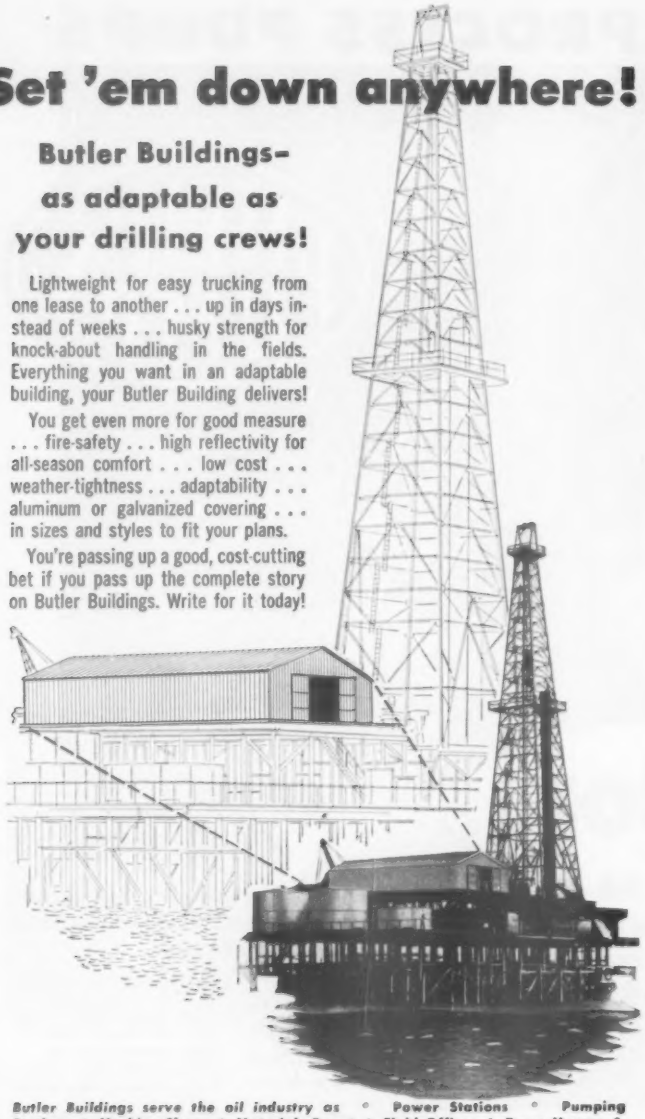

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Pipe-Line Movement Of Crude Oil

(Continued from page 113)

will be canceled and no oil may be shipped, although subsequent applications may be made. Records must be kept by transporters of crude of the volumes shipped and who received them. Weekly stock reports are required from operators whose total storage exceeds 10,000 bbl.

Products tenders of materials produced in refineries and gasoline plants must be filed before any movement of such products takes place. Most of the rules applying to other tenders applies to tenders for product shipment.

A nomination report must be submitted by purchasers of crude oil on or before the tenth day of the month prior to the month reported. The report must be filed separately for each commission district. This report is used to establish allowable oil production for the next month.

Answer to "Check Chart"

The photograph on page 82 was recently taken by the Journal's staff photographer of:

New steam turbine on a 6-in. vertical pump serving fluid catalytic cracker, Union Oil Co., Wilmington, Calif.

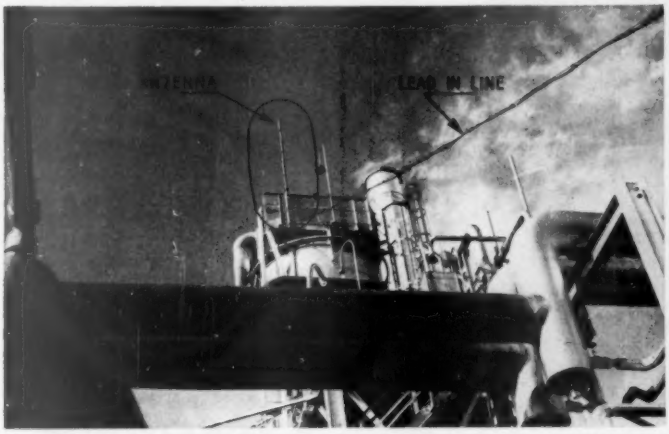
BOOKS

FIELD GEOLOGY. By Frederic H. Lahee. Published by McGraw-Hill Book Co., 330 West Forty-second Street, New York. 883 pp. $8.50.

Here is the fifth edition of this outstanding field manual. The revision improves and brings up to date the existing material and includes all new developments in such areas as geophysics, well logging, and air photography. It also incorporates additional data on lineation, calcareous reefs (bioherms), paleogeology and paleogeography, time relations of stratigraphic units, gamma-ray and neutron logging, caliper logging, lithofacies maps, and panel or fence diagrams. A short section discusses underground surveying, and there are four new appendixes on natural tangents, curvature and refraction corrections, length of degrees of the parallel, and length and degrees of the meridian.

A GUIDE TO SALES QUOTA SETTING. By John E. Ullmann. Published by Chemonomics, Inc., 400 Madison Avenue, New York 17. 63 pp. $3.

This volume discusses the purposes sales-quota systems can serve, the types which are used, and how they are applied in industry. Specifically, the book examines quotas in the light of market and product characteristics, lists the types in common practice, and describes specific purposes, such as profit control, selective selling, sales mixture control, and so on. A special section emphasizes the use of quotas in company sales contests.



THE REFINERY'S vacuum distillation tower gives the base station's antenna sufficient height to reach mobile units at a distance of 35 to 40 miles.

Payout in 1 year indicated for refinery's small radio network

George Weber

RAPID payout is indicated for a small radio network operating in the Casper, Wyo., refinery of Standard Oil Co. (Ind.). This new communications system provides immediate contact between dispatchers, shops, and service and foremen's vehicles operating throughout the refinery.

The Casper plant is a consolidation of two formerly separate plants. It is a complete refinery, and the numerous processing units are widely distributed over a 320-acre site extending 2¼ miles in length. As a result, intraplant communications have presented a problem.

When proposing the use of radio, maintenance engineers predicted that the services of vehicles and crews could be so expedited that lost time amounting to 1 hour per vehicle per day could be eliminated. For the 10 vehicles to be initially equipped with radios, this saving would amount to about $30 per day, or roughly $7,800 annually, based on a 5-day week.

A pay-out of the $8,000 network was thus indicated in about 13 months. Preliminary results with the network show that savings will better the engineers' estimates, and the radio equipment may pay for itself in less than a year.

How setup works . . . Two remote-control units operate through the main station. One is located in the plant dispatching office for labor and trucks, and the other is placed in the machine shop. Mobile units, rated at 10 watts are installed in the following vehicles:

Two flat-bed general-purpose trucks, equipped with tail-gate lifts.

A pipe-shop truck.

A boiler-shop truck.

A carpenter-shop truck.

Two machine-shop trucks used on spot repairs.

A welding-shop foreman's pickup truck.

Two pipe-shop foremen's pickup truck.

An insulating-department foreman's pickup truck.

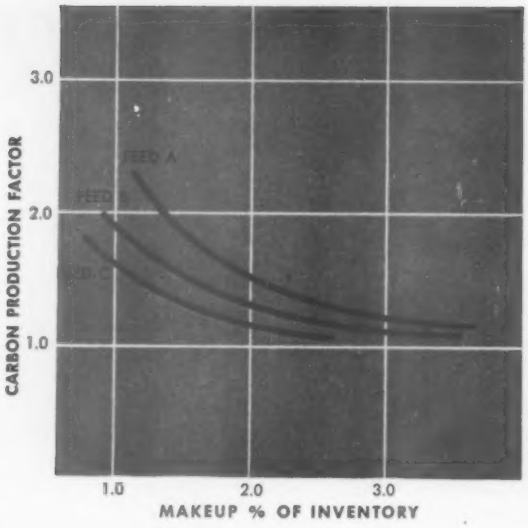
A labor-department general-foreman's car.

A labor-department foreman's pickup truck.

Base station . . . The base station is equipped with an 18-ft. antenna which is fixed to the top platform of the refinery's vacuum distillation tower, 65 ft. above ground level. This elevation gives the base station a range of 35-40 miles to mobile units. Its location is such that mobile units have encountered no serious blind spots in the plant.

THIS IS ONE of the two control points for the fixed station in the refinery radio network, which are located in the dispatcher's office and the machine shop.

A HIGH VOLUME of mobile-to-mobile radio messages has been noted in the network set up at the Casper, Wyo., refinery of Standard Oil Co. (Ind.).



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UNIT CATALYST COST	TONS/$1000	CPF
$350/TON	2.86	2.0
$155/TON	6.35	1.4
$100/TON	10.0	1.2

AT CARBON BURNING LIMITATION EXTRA CAT CRACKER THROUGHPUT AVAILABLE BY REDUCING CPF IS:

CPF	**PERCENT INCREASE IN THROUGHPUT	APPROXIMATE EXTRA INCOME
2.0		
1.4	23.5	$ 9,000
1.2	36.5	$14,500

**Basis catalytic cracking operation at 30,000 B/D throughput.

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CATALYSTS AND ADSORBENTS

*T. M. REG. U. S. PAT. OFF.

Mobile units . . . Mobile units are installed either in glove compartments or in the center of the vehicle instrument panel. With 18-in. antennas they permit mobile - to - mobile communication over ranges of 5-10 miles. The mobile units take 12 amp. on standby and 28 amp. during transmission. Experience to date indicates that some difficulty is to be expected with the standard 6-volt automotive electrical system. However, no additional equipment has been installed.

Efficiency up . . . Although the network is relatively new and no conclusive data are yet available to measure its worth, it has already exceeded expectations in raising the efficiency of general maintenance in the plant. Vehicles are put to greater use by dispatching from one job to another without returning to their respective shops. The problem of locating foremen in the field has been notably simplified. Monitors note a high frequency of mobile-to-mobile messages between foremen and their vehicles and among foremen themselves. These contacts were particularly time-consuming before the advent of radio.

In addition to the savings in routine operations, the radio network is expected to play a vital part in any possible future emergencies. Radio will also improve the plant protection system, especially in case of war. With such future emergencies in mind, management is considering the installation of standby power for the base station.

Equipment . . . The equipment installed at Casper consists of Motorola FMTRU-41V mobile transmitter - receivers and a FSTRU-1400 BR fixed unit. The company's license permits the use of 25 mobile and 1 fixed station with 2 control points operating in the 153.17 mc. channel.

Portable threading bar

A PORTABLE boring and threading bar to cut either a taper or straight thread in pump bodies for valve seats when threads are damaged may be constructed from spare parts and scrap metals normally found around any machine shop *(see drawings above)*.

The portable tool enables the worn threads to be renewed with the pump in its normal location and eliminates the necessary rigging and transportation of pump bodies required when all work is done in the shops.

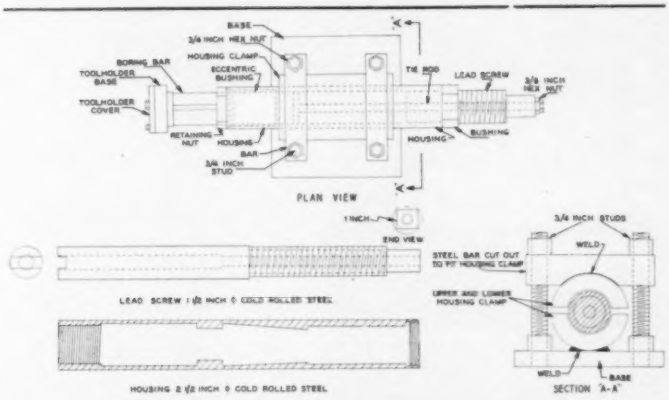
Base . . . The base of the tool is bolted to angle irons which provide a mounting for the tool on individual jobs. One leg of the angle bolts to the base and the other leg bolts to suitable supports which vary from job to job.

Essential parts of the tool consist of lead screw, housing, housing clamps, eccentric bushing, boring bar, and tool holder. The lead screw is fitted into the housing and force is applied to the squared end of the lead screw by use of an air motor.

Studs attached to the base of the tool are used as traveling arms for the upper half of the housing clamp. The lower half is welded to the base. Regular hexagonal nuts are tightened or loosened to make up the upper housing clamp which consists of a steel bar cut out to fit housing clamp, which is welded to the bar.

Bushing . . . The eccentric bushing and boring bar are so arranged to impart motion to the tool holder at extreme end of the boring tool. The necessary cutting tool is fitted into the holder and performs the desired operation as rotary motion is applied to the lead screw.

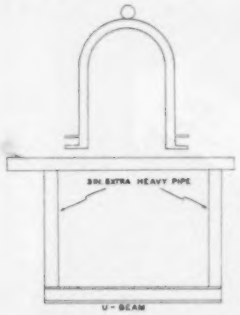
The method is used by Sinclair Refining Co., Houston.



Jig Made From Scrap Metal Used With Straddle Carrier

A jig has been constructed from scrap metal by Sinclair Refining Co., Houston, which may be used with a straddle carrier for moving heavy pieces of equipment, such as tube bundles, pumps, and similar items.

Instead of requiring that the equipment be blocked up or having to rig up special facilities for handling the items, the straddle carrier merely places the jig astride the piece of gear to be moved. The item is secured to the overhead pipe on the jig by means of



a chain and the carrier then lifts the jig and equipment en toto and moves them to the new location.

The jig consists of two lengths of 3-in. extra-heavy pipe bent into the shape of U's, a long length of 3-in. extra-heavy pipe, and two lengths of U-beams.

The curved U-pipe is placed in an inverted position and welded to the two U-beams at the downward ends.

The straight length of pipe is welded across the top of the jig to provide necessary support and also extends past the U-sections so that chains may be placed around the equipment and secured to the extremities of the pipe.

The jigs may be constructed with any opening and any length so as to conform to particular straddle carriers as well as particular services at different plants.

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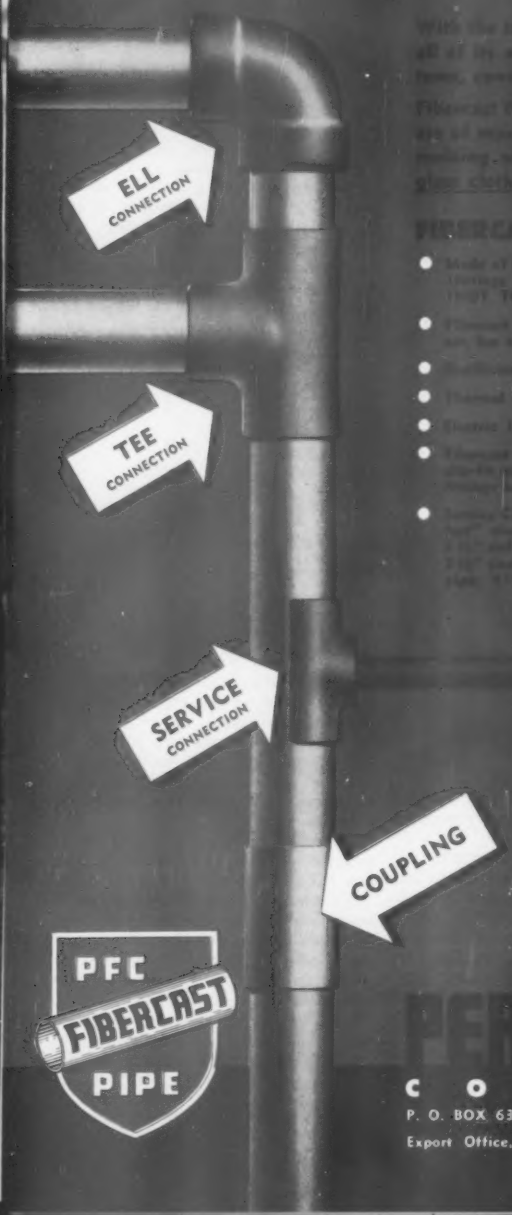

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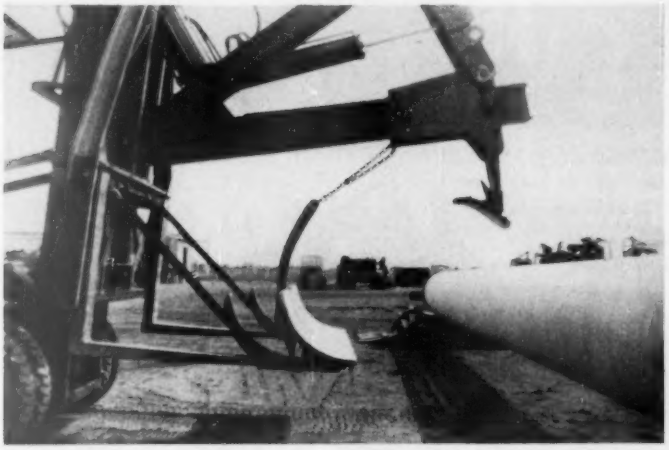

BEFORE PICKING UP this 60-ft. length of 30-in. wrapped pipe, the cradle is tilted so that it readily slides underneath the pipe. The rubber-padded shoe is then pressed downward to clamp the pipe.

Lift cradles coated pipe, gently places it on trailer at Pacific Pipelines' yard

D. H. Stormont

WRAPPED, large-diameter pipe is being handled quickly and without damage to the coating by fork-lift trucks at the Montebello, Calif., pipe yards of Pacific Pipeline Construction Co.

Adaptation of the versatile trucks to this use was made possible through installing rubber-padded gripping devices on the knife and fork employed in lifting and transporting unwrapped large-diameter pipe. The innovation was developed by C. O. Porter, plant manager for Pacific Pipeline at Montebello.

The two trucks being used are standard 9-ton capacity fork-lift machines, equipped for handling pipe. This conversion consisted principally of adding a beam and two hydraulic rams. Thus equipped, the truck can pick up or pile unwrapped pipe from or in a nested position, carrying as many as three lengths of 34-in. diameter pipe. *(The Oil and Gas Journal, March 30, 1950, page 90).*

Cradle attached . . . For handling wrapped pipe a cradle was attached to the fork lift. A ¾-in.-thick rubber pad was vulcanized to the 8-ft.-long cradle, which is free to pivot about its lower edge. Set-screws hold the cradle shoes in place on the forks, and the entire cradle assembly is cross-braced to the superstructure which supports the fork.

To secure the pipe in place in the cradle, a rubber-padded shoe was installed on the knife which is normally used for rolling unwrapped pipe out of a nested position. The shoe is bolted to the knife so that it is readily removable, as is the cradle assembly.

Picking up pipe . . . When the truck is to pick up a length of wrapped pipe, the dolly supported knife is traversed to the rear of the beam. Since the cradle is attached to the dolly by a chain, this action results in the cradle tilting backward and assuming an almost horizontal position.

Thus positioned, the cradle is moved under the length of pipe to be lifted and moved. Pressure applied by the two hydraulic rams actuating the beam and knife results in the pipe being securely wedged on the cradle. Thus held, the truck moves the pipe to the point desired.

UNLOADING WRAPPED PIPE likewise is a simple process. The fork-lift truck will lay the 60-ft. length on the truck-trailer, release pressure on the two holding devices, and then back away. Cradle can carry as many as three joints at once.

ANGLO-IRANIAN OIL COMPANY, LTD., with its subsidiary and associated concerns, is one of the major units of the world petroleum industry.

Its principal sources of crude oil production are in the Middle East. Through its prospecting subsidiary, the D'Arcy Exploration Company, it is interested in oil-bearing territories in many other parts of the world.

The Company operates refineries in Great Britain, France, Belgium, Germany, Italy, Israel and Australia.

Distribution and marketing of oil products are effected both by the Company itself and through various associated companies. For sea transport its shipping subsidiary, the British Tanker Company, operates one of the largest fleets of ocean-going tankers. The Company's principal research establishments are in Great Britain, at Sunbury in Middlesex, and at Kirklington in Nottinghamshire.

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THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

THE CENTRIFUGAL COMPRESSOR—3

Effect of Controlled Preswirl

by C. F. Koenig, III*

TYPICAL performance curves for a single-stage centrifugal compressor were given in Fig. 2 of No. 37 *(The Oil and Gas Journal, January 12, 1953)*. The performance parameters given in this figure are far distant from the terms with which pipe-line operators ordinarily deal, such as standard cubic feet per day, pressure ratio, and horsepower. However, it is well to remember that any charts in such terms must first start from data of the nature as given in Fig. 2 of the preceding installment.

The figure illustrates a number of interesting facts about the characteristics of a centrifugal compressor. With a fixed resistance to pump against (i.e. a nozzle, orifice, etc.), the flow of a single-stage centrifugal compressor will vary directly as the speed, the head will vary as the square of the speed, and the power required for compression will vary as the cube of the speed, all to a close degree of approximation. Some deviation from these relations may be expected where low Reynolds numbers or high Mach numbers occur in the flow passages, but such circumstances seldom obtain in pipeline applications. Unstable operation occurs below approximately 50 per cent of the flow for optimum performance, and operation in this range should be avoided.

It is usually considered distinctly advantageous for the head or pressure-ratio curve of a centrifugal compressor to droop as little as possible over a wide range of flow. It is possible to design a compressor so that this droop will be very gradual, but some droop must always be present for stable operation. In certain applications for pipe-line compressors, notably the case where the driver is a constant speed motor, it is desirable to improve upon even the flattest head-flow curve obtainable. The solution in this case is the use of adjustable inlet guide vanes which impart swirl to the fluid before it enters the impeller.

The effect of controlled preswirl on the output of a centrifugal compressor can be best explained by typical velocity diagrams constructed at the inlet and discharge of the impeller. For normal operation, i.e. where no preswirl is introduced, the diagrams are as shown in Fig. 1 (a). The notations on the velocity vectors are defined as follows:

C = absolute velocity
W = velocity relative to the rotating impeller
U = linear velocity of the impeller blades
β_1 = flow angle at impeller inlet
C_u = tangential component of absolute velocity
Subscripts 1, 2 = impeller inlet and outlet conditions, respectively.

The classical relation for the work in any turbomachine is

$$\text{Work per lb. of fluid} = \frac{U_2 C_{u2} - U_1 C_{u1}}{g}$$

In Fig. 1 (a) the absolute inlet velocity is meridional, or perpendicular to the tangential direction, so that C_{u1} is zero and the work equation reduces to

$$\text{Work per lb. of fluid (no preswirl)} = \frac{U_2 C_{u2}}{g}$$

In Fig. 1 (b) preswirl in the direction of rotation has been introduced, resulting in a modified inlet velocity diagram. The discharge diagram will remain substantially unchanged. Since the C_{u1} term is positive, the work will be less than that of the normal inlet case by the quantity $U_1 C_{u1}/g$. Maximum efficiency will occur when the inlet flow angle β_1 is the same as its value with no preswirl which requires lower values of C_1 and W_1, hence a lower flow.

In Fig. 1 (c) preswirl against the direction of rotation has geen introduced. Here the C_{u1} term is negative, so that the work will be greater than that of the normal inlet case by the quantity $U_1 C_{u1}/g$. Maximum efficiency again will occur at the original value of β_1 which now requires larger values of C_1 and W_1, hence a larger flow.

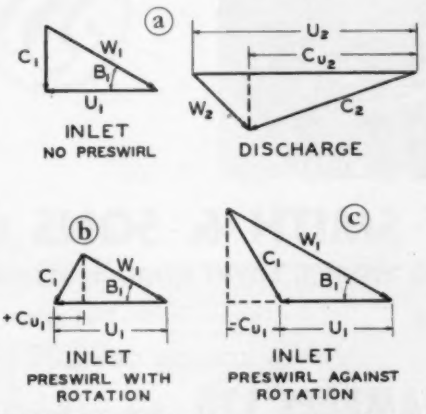

FIG. 1—Effect of inlet guide vanes on velocity diagrams.

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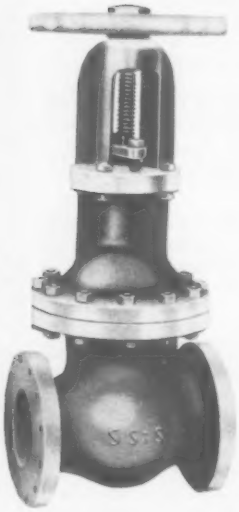

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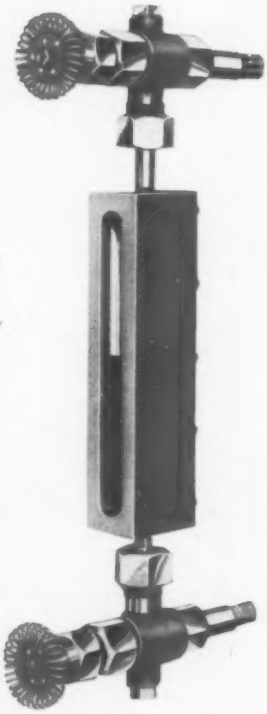

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GALVANIC CORROSION—3*

Other Types of Galvanic Cells

ANOTHER common type of galvanic cell occurs on the surface of new pipe (Fig. 7). During the course of manufacture, particles of mill scale are imbedded at the surface of the pipe. This mill scale acts as though it were a dissimilar metal from the pipe wall. Current in the cell will flow from the pipe (anode) through the ground onto the scale and return through the pipe metal.

Still another common type of galvanic cell is that produced by having differences in the surface condition of the pipe metal. (Fig. 8). The scars or scratches made by a pipe wrench used to install a service line become active anode areas as soon as the line is buried. The same is true of the bright surface of the shallow threads adjacent to a coupling or fitting along a service line. In both cases, the bright surface becomes the anode, while the rest of the pipe surface is the cathode. With some soils these cells can be most active and destructive, because they represent almost the ultimate in unfavorable ratio of anode to cathode areas.

So far we have looked only for galvanic cells of the dissimilar metal type. The second general type, those produced by dissimilarity of electrolyte, we will find along our pipe lines because of difference in soils. Fig. 9 illustrates the condition at a location having two completely different types of soil structure. One section of the pipe line is laid through sandy loam, while a short distance away the pipe is buried in a clay-type soil. A dissimilarity exists. In this case, it is a dissimilarity of electrolyte, and the pipe in the anode area will corrode, while that in the cathode area will be protected. If the resistance to current flow through the soil from the anode to the cathode is high, the rate of corrosion will be slow. Conversely, if this resistance to current flow is low, the rate of corrosion will be rapid.

Another type of galvanic cell produced by dissimilarity of soils is illustrated in Fig. 10. In this case, the difference is created by a mixture of different soils. Large clods of dirt, originally from various depths in the ditch, may rest directly against the pipe after the dirt is backfilled. Such a situation is more apt to occur when the ditch is dug by hand. Machine ditching usually results in a thoroughly mixed spoil bank, producing a great number of small cells having a tendency to neutralize each other, resulting in a slow corrosion rate, but where large clods of clay touch the pipe the tendency is for that area to become the anode of a galvanic cell. Galvanic cells, having their anode and cathode areas around the circumference of the pipe, are often spoken of as short-path cells, and can produce very rapid pitting.

Another galvanic cell of the dissimilar electrolyte type occurs when the soil throughout the depth of the ditch is uniform as to type or kind, but the pipe rests on heavy, moist, undisturbed ground at the bottom of the ditch, while the rest of the circumference is in contact with the drier backfill. The greatest dissimilarity, and therefore the most dangerous condition, occurs along this narrow strip at the bottom of the pipe. It is one of the conditions that can produce severe pitting.

*Taken from **A Manual on Underground Corrosion,** Columbia Gas System Service Corp.

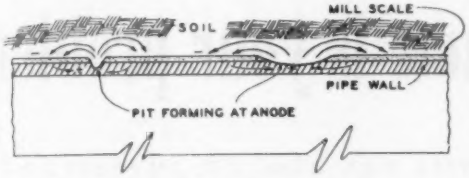


Fig. 7—Pitting due to mill scale.

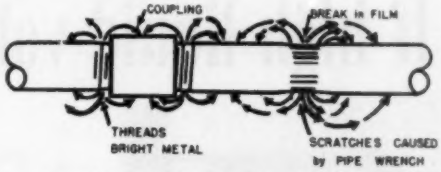


Fig. 8—Corrosion caused by dissimilarity of surface conditions.

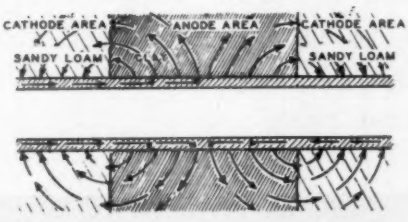


Fig. 9—Corrosion caused by dissimilar soils.

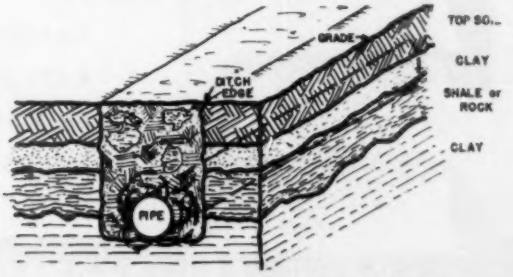


Fig. 10—Corrosion caused by mixture of different soils.

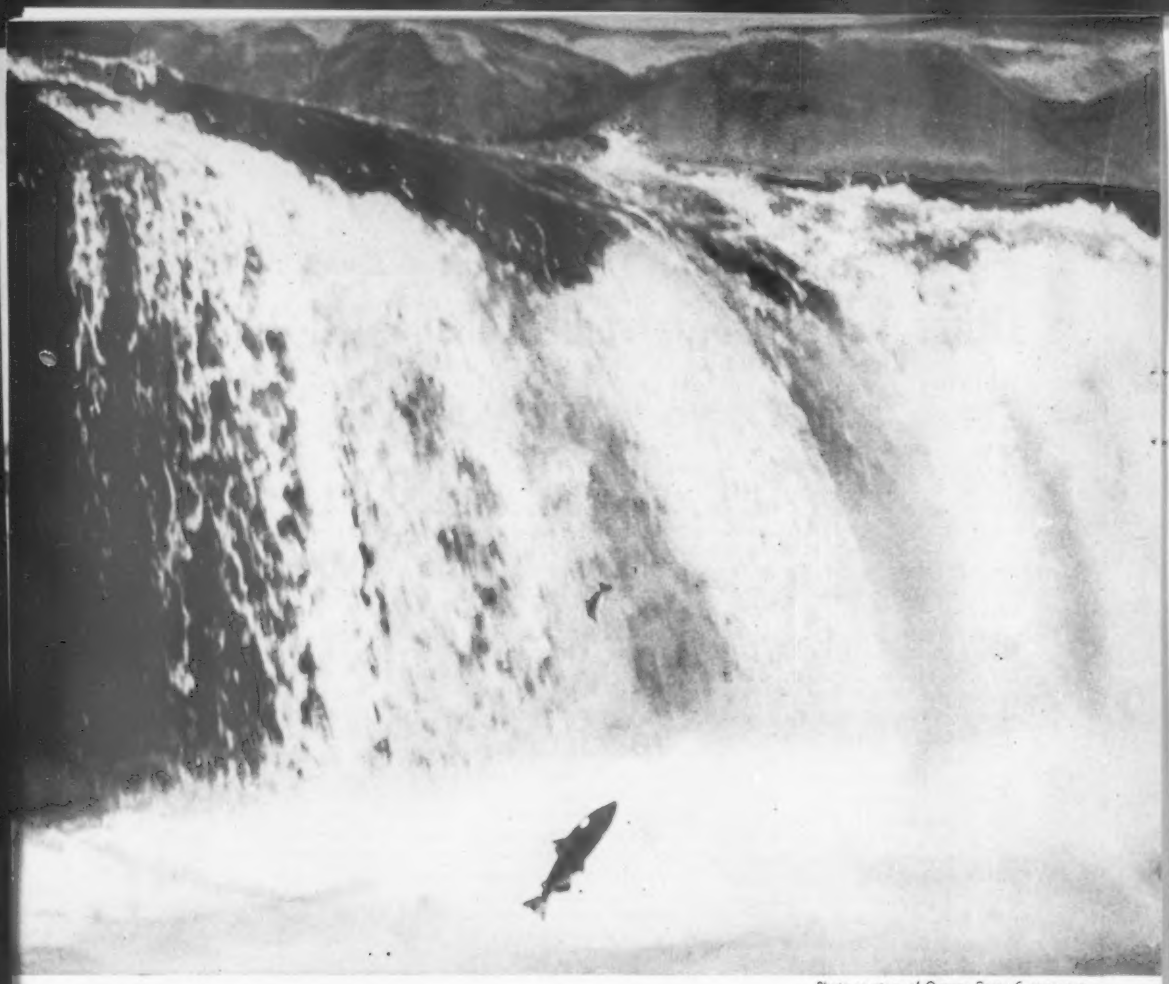
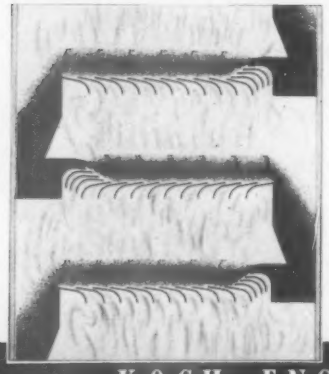


Photo courtesy of Oregon Game Commission

If high liquid volume is your problem



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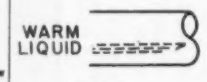
h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a COOL TUBE and WARM LIQUID

Tube Position: Horizontal

Liquid Movement: Streamline Flow

Special Consideration: Liquids of low viscosity.



EQUATION:

$$h_f = 1.62\frac{k}{D}\left[(1+0.015Z^{\frac{1}{3}})\left[\frac{\mu}{\mu_f}\right]^{\frac{1}{3}}\right]\left[\frac{4wC}{\pi kL}\right]^{\frac{1}{3}}$$

$$\text{where } Z = \left[\frac{D^3\rho^2 g \Delta t}{\mu_f^2}\right]$$

TERMINOLOGY:

h_f - Heat transfer coefficient, BTU/hr. sq. ft. °F.

k - Thermal conductivity, BTU/hr. sq. ft. °F./ft.

D - Diameter of pipe, in feet

μ - Viscosity at bulk temperature of the stream, lb./hr. ft.; μ_f is evaluated at t_f, μ_s at t_s.

w - Mass rate of flow, lbs./hr.

C - Specific heat at constant pressure, BTU/lb.°F.

L - Heated length of pipe, in feet.

β - Coefficient of volumetric expansion.

Δt - Temperature difference between bulk temperature of fluid and t_s, °F.

ρ - Density, lbs./cu. ft. at t_f.

g - Acceleration due to gravity, 4.17×10^8 ft./hr. hr.

t_s - Temperature of surface, °F.

t_f - Average film temperature, $t_f = 0.5\ (t_s + t)$.

LIMITATIONS:

The equation applies to fluids flowing with Reynolds numbers less than 2100. It is rarely used, since in most applications liquids of low viscosity will not move in streamline flow, in which case the equation for turbulent flow will apply.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry, (1948).

for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
β -- see pp. 200-206, 1675.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1688, 1696.

REFERENCES:

1. A. P. Colburn, Trans. Amer. Inst. Chem. Eng. 29, pp. 174-210, (1933).

2. Heat Transmission, W. H. McAdams, pp. 186-192.

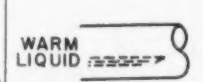
P 2 b (1) (a)

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a COOL TUBE and WARM LIQUID

Tube Position: Horizontal

Liquid Movement: Streamline Flow

Special Consideration: Liquids of medium to high viscosity.



EQUATION:

$$h_f = 1.86\frac{k}{D}\left[\frac{4wC}{\pi kL}\right]^{\frac{1}{3}}\left[\frac{\mu}{\mu_s}\right]^{0.14}$$

TERMINOLOGY:

h_f - Heat transfer coefficient, BTU/hr. sq. ft. °F.

k - Thermal conductivity, BTU/hr. sq. ft. °F.

D - Diameter of pipe, in feet.

μ - Viscosity at bulk temperature of the stream, lb./hr. ft. μ_s evaluated at t_s.

w - Mass rate of flow, lbs./hr.

C - Specific heat at constant pressure, BTU/lb.°F.

L - Heated length of pipe, in feet.

Δt - Temperature difference between bulk temperature of fluid and t_s, °F.

ρ - Density, lbs./cu. ft.

g - Acceleration due to gravity, 4.17×10^8 ft./hr. hr.

t_s - Temperature of surface, °F.

LIMITATIONS:

Reynolds number ($DV\rho/\mu$) should be below 2100.

Equation applicable to liquids of medium to high viscosity.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1688, 1696.

REFERENCES:

1. Sieder, E. N. and Tate, G. E., Ind. Eng. Chem. 28, pp. 1429-1436 (1936).

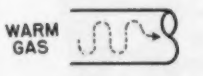
2. Heat Transmission, McAdams, pp. 189-190.

P 2 b (1) (b)

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a COOL TUBE and WARM GAS

Tube Position: Horizontal

Gas Movement: Turbulent



EQUATION:

$$h_f = 0.023\frac{k}{D}\left[\frac{DV\rho}{\mu}\right]^{0.8}\left[\frac{C\mu}{k}\right]^{0.3}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. °F.

D - Inside diameter of tube, ft.

V - Velocity of gas, ft./hr.

ρ - Density of gas, lbs./ft.^{3}

μ - Absolute viscosity of gas, lbs./hr. ft.

C - Specific heat of gas, BTU/lb.°F.

k - Thermal conductivity of gas, BTU/ft.^{2} hr. °F./ft.

LIMITATIONS:

Reynolds number $\left(\frac{DV\rho}{\mu}\right)$ must be over 2100.

SIMPLIFIED EQUATION:

Assuming a value of 0.78 for ($C\mu/k$) which is an average value for many gases and since the viscosities of many gases do not vary widely, the following simplified equation may be obtained.

$$h_f = 0.0144\frac{C(V\rho)^{0.8}}{D^{0.2}}$$

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1688, 1696.

REFERENCES:

1. Process Heat Transfer, Kern, p. 105.

2. E. N. Sieder and G. E. Tate, Ind. Eng. Chem., 28, 1429-1436 (1936).

3. Elements of Heat Transfer and Insulation, 2nd Edition, Jakob and Hawkins, p. 114.

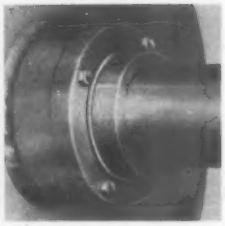
P 1 e

Easier to repack than ever before

LIGHTNIN SERIES SE (gear drive). Sizes 1 to 25 HP. Also available in V-belt drive.

No wrenches needed to shut off stuffing box from tank contents

TO SHUT OFF WITH TANK FULL, operator loosens a set screw and turns handles on bronze housing. It's as easy as closing a valve.



INSIDE THE TANK, a Teflon gasket is compressed between the seal collar and end cap. This positively seals off tank contents.

TOP ENTERING turbine and paddle type mixers for open or closed tanks. Sizes 1 to 500 HP.

LIGHTNIN PORTABLE MIXERS ... Used everywhere for hundreds of fluid mixing jobs. Thirty models to choose from. Sizes ⅛ to 3 HP.

These two new LIGHTNIN Side Entering Mixers cut maintenance time in half, they're so easy to service.

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Modern Bubble-Tray Construction—1

by H. C. Glitsch* and R. W. Fowler*

IT has been estimated that well over half of the investment dollar, for refinery process equipment, is chargeable to distillation equipment. The bubble tray itself constitutes only a fractional, but still an appreciable, part of this investment. There are virtually tens of thousands of bubble trays being used in the industry today. Despite the large number of these trays in use, both the initial design and performance in operation still present mysteries to design engineers and operators alike.

Some of the factors that process designers consider contributory to bubble-tray efficiency are: the size of the vapor bubbles rising through the liquid, the velocity of the vapors, which if too high might cause excessive entrainment, the ability of the downflow of liquid from tray to tray to mix thoroughly with the tray below, and finally, the prevention of vapor bypass through only one side of the bubble tray.

Bubble-tray design . . . This is divided into two distinct phases: The chemical-engineering (or process) phase and (2) the mechanical-design phase. The first has to do with the hydraulics of the tray, the vapor and liquid capacity, and the efficiency of the tray related to the chemical engineering function it is expected to perform.

The second has to do with (a) economy of manufacture, strength, deflection specifications; (b) ability of the design to mechanically meet the chemical engineering requirements; (c) the problem of fitting a tower or vessel that is itself subject to size and out of roundness variations; (d) the desirable feature of installation through a relatively small opening; (e) the feature of removability; (f) mechanical ability to accept explosions or other pressure surges without being destroyed beyond economic repair; (g) absence of leakage of liquid after installation and corrosion resistance or allowance therefor; (h) a lack of metal mass; (i) the ease of cleaning; (j) the ability of tray to operate at elevated temperatures by either accepting locked-up stresses or by provision for thermal expansion.

Considerable experimentation, starting in about 1935 and involving different materials and methods of fabrication led to a design utilizing a separate supporting structure to provide for any deflection, load, or temperature requirements. This lightweight, alloy "truss-type" construction, shown in Fig. 1, has the following advantages: (1) the alloy material has resistance to coking and adherence of coke due to the smooth surface of the stainless steel and the absence of corrosion; (2) the material is wrought and rolled and therefore is inherently tough as compared with brittle cast iron, and (3) ease of maintenance and installation is obtained with the small sections which can be easily handled through a normal-sized manway.

This type of construction is also adaptable to all types of vapor-liquid contacting trays, encouraging freedom of design in process layouts with regard to spacing of caps and trays.

Pressure surges . . . A bubble tower is subject to pressure surges, at times of sufficient violence to lift the tray from its supports if it were not tied down securely. These surges are manifold and sometimes are caused by explosions resulting from air in the systems or by an unpredicted introduction of water into a tower operating at temperatures considerably above the boiling point of water. The truss-type design offers an excellent means to prevent the destruction of the bubble tray in the event of such an explosion, within the vessel, by allowing the tray floors to blow off of their supports, thereby equalizing the pressure on both sides of the tray. Violent pressure surges have been known to break every cast-iron bubble tray within a given tower. However, with the truss-type construction, the tray segments either blow out from under the frictional washers or bend the edge of the washer up which allows the tray floors to blow free. Due to the fact that there is no through bolting, there is, of course, usually no ripping or tearing out of bolt holes. Trays of the truss-type construction may be subject to damage during pressure surges. However, the tray parts generally can be economically salvaged by straightening or flattening.

The truss-type construction is basically a mechanical design. It is a mechanical design that can be adapted to the individual specifications of each process problem. Process engineers in the oil-refining and chemical-processing industries may prefer, for good logical reasons, round caps or caps of hexagonal, rectangular, square, and many other geometrical shapes. In each case these may be accurately designed so that satisfactory results are achieved.

*Fritz W. Glitsch & Sons, Inc. From paper presented at John Zink Process Heating Seminar, Tulsa, 1952.

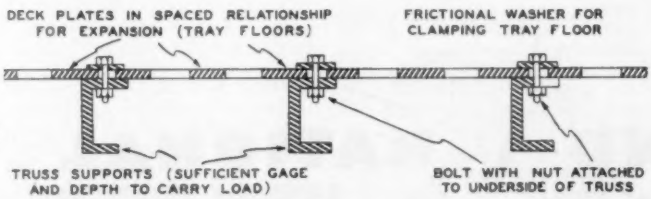
DECK PLATES IN SPACED RELATIONSHIP FOR EXPANSION (TRAY FLOORS)
FRICTIONAL WASHER FOR CLAMPING TRAY FLOOR
TRUSS SUPPORTS (SUFFICIENT GAGE AND DEPTH TO CARRY LOAD)
BOLT WITH NUT ATTACHED TO UNDERSIDE OF TRUSS

Fig. 1—Truss-type construction. Tray floors can blow off their supports to minimize damage in event of violent pressure surge.

CONDENSED

Statement of Condition

AT THE CLOSE OF BUSINESS DECEMBER 31, 1952

RESOURCES

CASH	$ 92,424,929.21	
UNITED STATES SECURITIES	49,790,035.41	$142,214,964.62
Municipal Bonds and Other Securities		6,012,295.84
Loans and Discounts	103,618,480.72	
Commodity Loans	16,268,029.00	119,886,509.72
Second National Bank Building		1,500,000.00
Future Banking Home Site		1,635,403.79
Other Real Estate		1.00
Vaults, Furniture and Fixtures		1.00
Interest Accrued on Investments		631,860.77
Customers Liability Under Letters of Credit		7,746,357.12
Customers Liability Under Acceptances		3,591,343.70
Other Resources		51,344.82
		$283,270,082.38

LIABILITIES

Capital	$7,500,000.00	
Surplus	7,500,000.00	
Undivided Profits	2,959,061.05	$ 17,959,061.05
Reserved for Dividends		300,000.00
Reserved for Taxes, Interest and Other Purposes		3,006,984.82
Letters of Credit		7,746,357.12
Acceptances		3,753,166.49
DEPOSITS:		
Individual, Firm and Corporation	$182,244,938.24	
Bank (Net)	62,382,157.63	
United States	5,877,417.03	250,504,512.90
		$283,270,082.38

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Fast Drilling in East Texas Basin

by Joseph A. Kornfeld

FAST, easy cutting in soft Cretaceous shales is the drilling story in the new Noble Kee field in Cherokee County, Texas. The objective Woodbine sand is reached in only 3 days after setting surface pipe at about 100 ft. Only three 8⅜-in. bits are used in cutting 3,750 ft. of long hole, or an average of 1,250 ft. per bit.

Already two good completions have been made in the Woodbine sand at a fault block separated from East Texas oil field proper. The second well is reported to have flowed initially 10 bbl. of 44°-gravity oil per hour from a perforated 4-ft. interval of Woodbine sand. Currently there are four drilling rigs active in the new field, all scheduled for 4,100-ft. contracts to the Woodbine.

Drilling Contractors

Drilling contractors operating in the new field include Rexall Drilling Co., Carter-Jones Drilling Co., and Jim McMurrey, all of Kilgore, Tex., and E. & H. Drilling Co. of Corpus Christi. H. C. Jones is manager and J. K. Maxwell is partner of Carter-Jones Drilling Co. Rex Segall and Jack McCubbins own Rexall Drilling Co.

McMurrey operates a new draw works driven by two 375-hp. motors. Draw works is mounted on a 9-ft. substructure supporting a 136-ft. steel derrick. Two 7¾ by 14-in. mud pumps are employed.

Karl Edwards, of E. & H. Drilling Co., uses a single-engine-model power rig equipped with a 300-hp. capacity transmission. The rated capacity of the rig is 5,000 ft. using 4½-in. drill pipe, or 6,000 ft. using 3½-in. drill pipe.

Rexall drilled the discovery well for Stone & Ray et al 1 Noble Kee which was completed on December 21, 1952. This firm uses a double-drum 5,000-ft. drilling rig.

Days to drill totaled 20 from spudding to completion into flow tanks. Rexall cut a 13⅜-in. surface hole to 243 ft. and set 8⅝-in. surface pipe. Long hole was 9-in. hole cut to 3,772 ft. total depth. The 5½-in. oil string was set and cemented 2 ft. off bottom for completion. The contractor took three cores including two in the base of the Austin chalk and one in the top of the Woodbine.

A single drill-stem test was taken in the Woodbine. A 500-ft. water cushion load was used. Quarter-inch chokes were set, top and bottom, and the tool left open for 45 minutes. Recovery opposite the Woodbine sand in the discovery well was 2,500 ft. of oil and 30 ft. of brackish water from a 3-ft. penetration yielding 1½ ft. net sand.

Subsurface geology . . . Discovery was made on subsurface geology mapped by James Tune, Jr., of Longview, Tex., who mapped a subsurface fault from a group of outlying wells south of East Texas field.

Discovery well . . . Noble Kee field lies in northeastern Cherokee County. It is 3½ miles south of East Texas field and 2 miles west of Stegall field (opened by Clarke, Stone & Stegall 1 Kangerga Bros.), the nearest oil production. Discovery well of Noble Kee field is Striker Oil Co. (formerly Stone & Ray et al) 1 Noble Kee, located 6 miles southwest of the village of Price. It is 1,980 ft. from the north line and 4,700 ft. from the west line of R. H. Tobin Survey, Abstract 833, and ½-mile south of the V. B. Stone 2 Deloach & Bond, a dry hole.

The discovery well was completed on December 5, 1952, for an initial potential of 64.17 bbl. of 42.5°-gravity oil per day through a 5/64-in. choke. Initial flowing tubing pressure ranged from 20 to 40 psig. and shut-in casing pressure 465 psig. Initial produced gas-oil ratio was 150 cu. ft. per bbl. It is an open-hole completion from a 3-ft. penetration of Woodbine sand topped at 3,767 (−3,422 ft.), and penetrated to 3,770 ft. where the 5½-in. pipe was set and cemented in an open-hole completion.

Second oil well . . . Jim McMurrey, Kilgore, drilled and completed the second oil well for this new field late in December 1952 at an offset 900 ft. southwest of the discovery well. His 1 J. R. Martin was originally drilled to a total depth of 5,714 ft. through the Woodbine sand into the Glen Rose series. The intervening Paluxy series was sandy shale and proved nonproductive.

This well required 16 drilling days from spudding to total depth; however, only 3 days were required beneath the surface casing to reach and test the Woodbine sand including sidewall coring of the Pecan Gap and Austin chalks. Operators plugged back to 3,850 ft. in the Woodbine sand and set a string of 5½-in. pipe to 3,846 ft. Gun perforator was run, and the pipe shot with five shots per foot from 3,752-56 ft. opposite the Woodbine sand.

On initial flow test on December 24, 1952, 1 J. R. Martin flowed 10 bbl. of 44°-gravity oil per hour and no water through a 5/64-in. choke.

BORE-HOLE, CASING AND CEMENTING PROGRAM NOBLE KEE FIELD, CHEROKEE COUNTY, EAST TEXAS

(Jim McMurrey, Kilgore, Tex., Contr.)

Bore-hole Diam. in.	Bits Used	Casing Diam. in.	Seat ft.	Cement sacks
15	1	10¾	102	100
8⅝	3	5½	3,850	150

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More oil; less down time.

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Relative Permeabilities From Capillary-Pressure Curves

by Ralph F. Nielsen*

THE previous installment of this series presented some equations which had been proposed in the literature to show the relation between capillary-pressure curves and relative permeabilities. These were derived using the "tortuosity" concept and regarding the capillary-pressure curve as a measure of pore-size distribution. The Kozeny equation was used to illustrate the tortuosity concepts but the specific surface, which occurs in this equation, was not used.

A relation between wetting-phase relative permeabilities and the capillary-pressure curve, using the specific surface and the Kozeny equation, was derived by Rapoport and Leas.[1] One of their basic premises is to regard the irreducible minimum wetting-phase saturation, that is, the minimum that will allow flow of that phase, as part of the solid matrix. This saturation denoted by S_i is the saturation at which the wetting-phase relative-permeability curve cuts the saturation axis, i.e., $K_r = 0$.

Consider a core completely saturated with the wetting phase. Employing the Kozeny equation, $K = \phi^3/ks^2$, if the minimum wetting phase is regarded as part of the solid, the porosity to be used in this equation is not that of the dry core, but $\phi = f(1 - S_i)$, where f is the dry porosity. The surface, s, is the boundary between the moving liquid and the immobile liquid or solid. This is, according to the assumptions, the same as the surface bounding the air when the liquid has been displaced to its irreducible minimum saturation by air. By Kozeny's equation, the permeability is then

$$K = f^3 (1-S_i)^3/ks_i^2 \qquad (1)$$

The specific surface s_i may be evaluated from the capillary pressure curve in accordance with the previous assumption. When an amount of liquid dV is expelled against the capillary pressure P_c, the amount of work done is $P_c dV$. This must be equal to work of forming surface, or γds, where γ is the surface tension. Assuming the bulk volume to be 1 cc., $-fP_c dS = \gamma ds$, where S is the wetting-phase saturation. If the gas at the minimum saturation S_i is completely bounded by the liquid, the total surface at S_i is given by

$$s_i = f/\gamma \int_{S_i}^{1} P_c dS \qquad (2)$$

where P_c is in dynes per square centimeter. Denoting the integral by a_1 (see Fig. 1), the single fluid permeability of the core is, from the above relations,

$$K = \frac{f^3 (1-S_i)^3 \gamma^2}{kf^2 a_1^2} \qquad (3)$$

At some saturation S, other than S_i, the immovable liquid as well as the gas phase are regarded as part of the solid. The value of ϕ to be used in the Kozeny equation is then $f(S_i - S)$. The flowing liquid is bounded by the immovable liquid, whose surface toward the movable liquid is fa_1/γ, and by the gas, whose surface is given by fa_2/γ, where a_2 is the area under the curve between S and unity. Then

$$K_w = \frac{f^3 (S_i-S)^3 \gamma^2}{kf^2 (a_1 + a_2)^2} \qquad (4)$$

If it is further assumed that the tortuosity for the moving part of the fluid is independent of saturation, the k is the same in Equation 4 as in Equation 3, and the relative permeability to the wetting phase is

$$K_r = K_w/K$$

$$= \left[\frac{S_i - S}{1 - S_i}\right]^3 \left[\frac{a_1}{a_1 + a_2}\right]^2 \qquad (5)$$

Equation 5 is the "minimum equation" of Rapoport and Leas and has been found to give results in remarkably good agreement with experiment, considering the simple and straightforward assumptions made in its derivation. Fig. 2 shows a comparison[2] between an average Bradford relative-permeability curve and one calculated using an average value of the second bracket of Equation 5.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

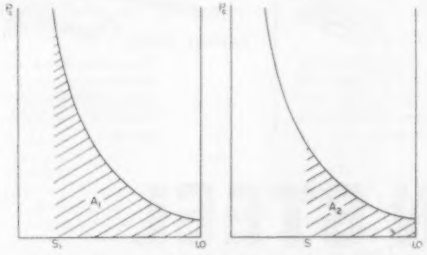

FIG. 1—Areas a_1 and a_2 to be used in the equations.

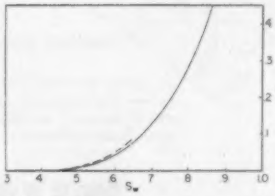

FIG. 2—Comparison of experimental (dotted line) wetting phase permeability values with those calculated (full line) by equations.

References

1. Rapoport and Leas, A.I.M.E. Trans. (Pet.) 1951, p. 83.
2. Kinney, M. S. thesis, Pennsylvania State College, 1951.

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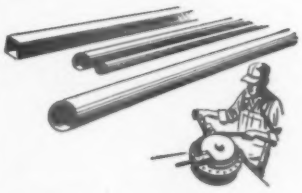

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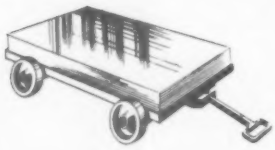

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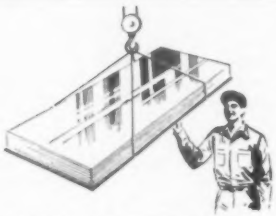

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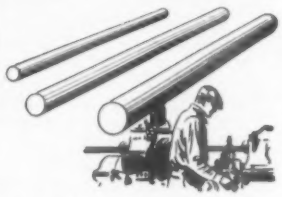

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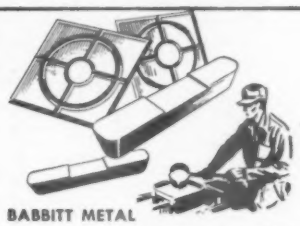

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QUESTIONS ON TECHNOLOGY

by W. L. Nelson
Technical Editor

Cost of Coking Plants

"Coking is now becoming a useful process. What is the cost of coking plants and how much does it cost to operate them?" J. S. M.

The cost of coking plants without loading or piling equipment was published[10] in Cost-imating No. 58, The Oil and Gas Journal, November 24, 1949, page 149. However, the values given there were checked to see if modern trends had changed the values (see Fig. 1). Six additional points were located and they seem in general to confirm the price structure stated in 1949 in the Cost-imating series. Only two points are badly out of line (both on the continuous contact process). One point, at a capacity of 10,000 bbl. per day, seems to be very low whereas the other (at 1,600 bbl. per day) seems to be very high. In addition to the above costs, it is necessary to spend several hundred thousand dollars for coke-handling equipment (piling or loading).

Costs at various dates were converted to the common date of 1952 (or 1946) by the Nelson Construction Cost Index (published monthly in The Oil and Gas Journal). Likewise, the operating costs discussed later herein were converted to 1952 by means of an Operating Cost Index.[14]

Operating costs . . . These are not entirely consistent. All data readily available from the literature are summarized in Table 1. The two direct costs of operation (References 3 and 6) of Table 1 should be raised (about 82 per cent) to put them on a comparable basis with the other costs. Likewise the complete coking (no gas oil) cost of Reference 1 should be reduced (about 64 per cent).

In addition, the cost of operation was considered in detail by the author of this page with the results shown in Table 2.

If all of these costs are considered it seems that fair estimates of the costs of coking are:

Delayed process, cents per bbl.	40
Contact process, cents per bbl.	32
Complete coking, cents per bbl.	62

To these can be added, of course, any amounts for overhead, research, labor burdens, etc., that are consistent with the policies of the company, leading to costs of 60 cents or even $1 per barrel.

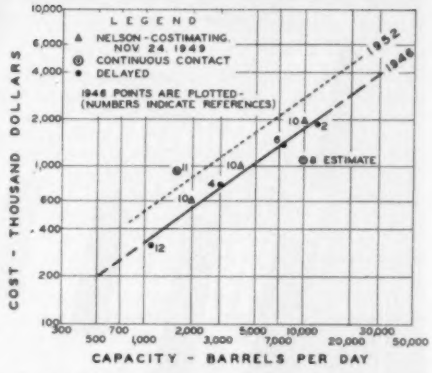

Fig. 1—Cost of coking plants (1946 and 1952) operating primarily for the production of gas oil.

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3. Jewell & Conner, Economics of Petroleum Coking for Cat Cracking Feed Preparation, Pet. Processing, Nov. 1950, p. 1199.
4. Tuttle, R. B., Catalytic Cracking Arouses Top Interest at WPRA Meeting (Wichita), The Oil and Gas Journal, June 14, 1947, p. 72.
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12. Private communication—1200 bbl. per day coker.
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TABLE 1—OPERATING COSTS (COKING) CORRECTED TO 1952 COST, FOR PLANTS THAT PRODUCE LARGE AMOUNTS OF GAS OIL

Operation—	Year	Capacity, B.P.D.	Cents per bbl. Then	Cents per bbl. Now	Ratio of B.P.D. to tons per day	$ per ton estimate§	Ref.
Complete coking*	1922	.....	50	77	‡12	‡9.22	1
Contact	1949	11,200	24	32.4	25	8.10	2
Contact	1951	10,000	35-50	56-80	‡20	‡13.60	8
Delayed	1950	10,000	†10.7	†16.1	32.4	5.22	3
Delayed	1947	3,000	20-25	27-34	‡28	‡8.55	4
Delayed	1951	7,500	†12.5	†20	25.8	5.16	6

*Little or no gas oil produced. †Direct costs only (no depreciation, maintenance, overhead, treating, etc.). ‡Estimate. §Not a proper basis because it charges all operating cost to coke whereas gasoline and gas oil should also be charged for part of the cost of operation.

TABLE 2—ESTIMATE OF COST OF COKING IN A 5,000-BBL.-PER-DAY PLANT

	Delayed process	Contact process	Complete coking
Labor and supervision	4.2	3.0	6.0
Fuel	6.0	4.5	9.0
Power	0.3	0.2	0.6
Water	2.2	0.6	3.0
Steam	2.0	....	4.0
Depreciation and maintenance*	14.0	14.0	18.0
TEL and treating	2.5	2.5	7.4
Loading or piling	0.2	0.2	0.6
Total	31.4	25.0	48.6

*14 per cent per year of original investment.

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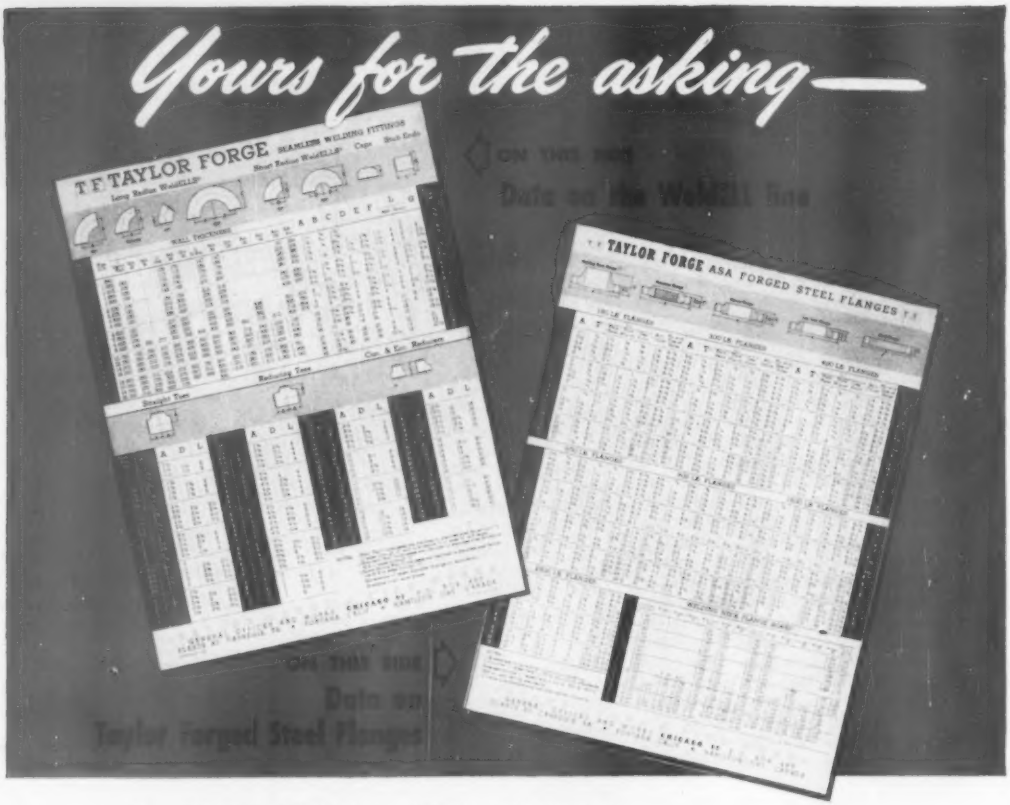

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 ALIPHATIC NITROGEN COMPOUNDS, a 44-page book, discusses in detail 35 aliphatic nitrogen compounds that are sold in commercial quantities, their uses in many industries, physical properties, specifications, shipping data, and constant-boiling mixtures. An important feature of this new book is an entire section devoted to specification test methods used by Carbide for its aliphatic nitrogen compounds. *Union Carbide & Carbon Corp.*

2 THE WELEX FOUR-WAY JET GUN is a summarized article covering a few of the problems encountered and some of the methods being used in oil-well completions that led to the development of the ideas, engineering, and research that made possible the design of this gun. *Welex Jet Services, Inc.*

3 OIL-FIELD EQUIPMENT. This complete oil-field-equipment catalog for 1953-1954 covers tubing anchors, blocks and hooks, blowout preventers, tubing catchers, drilling heads, valves, kellies, gas-lift equipment, packers, tubing spiders, rod and tubing strippers, tubing safety joints, swab accessories, swivels, and unions. Each item is illustrated, and accompanied with technical data. *The Gulberson Corp.*

4 FLEXIBLE POWER, a multicolored pamphlet, discusses an organization which offers engineering, plus hydraulic rotary-rig drives to solve power transmission problems. Pamphlet includes actual installation photos on six different drives. *Fluid Power Corp.*

5 DRAVO PRECISION BORED METER RUNS. Bulletin 1701 describes advantages to be gained by installing precision bored tubes in connection with flow-meter orifices. The precision machine-bored meter run gives standardized performance of measurement and permits use of any beta ratio. *Dravo Corp.*

6 R/M TEFLON PRODUCTS, an attractive 8-page bulletin, describes and illustrates gaskets, rings in irregular shapes, sheets, tubes, rods, tape, braided and plastic packings, packings for stuffing boxes and valve stems, and Vee-Flex packing rings. *Raybestos-Manhattan, Inc.*

7 RIGHT-ANGLE SPEED REDUCERS, a new 35-page catalog, contains information to assist the customer in selecting proper speed reducer for any job. A simple method for ordering reducers, and for estimating requirements, is also included. In addition, complete lubrication specifications for all reducers are listed. *Western Gear Works.*

8 PNEUMATIC BUTTERFLY CONTROL VALVES. Bulletin 8503 describes butterfly valves designed to regulate flow of air, gas, liquids, or steam in conjunction with indicating, recording, or nonindicating pneumatic controllers. Bulletin contains application data, specifications, dimensions, sizing data. *Minneapolis-Honeywell Regulator Co.*

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OIL AND GAS EQUIPMENT Digest CHECK IT

9 PREVENTING CORROSION. This multicolored brochure describes a new Polyken polyethylene protective tape coating available in black and aluminum gray. It is tough, elastic, highly oriented polyethylene film 8 mils thick with an extra-heavy superior-bonding synthetic adhesive 4 mils thick. Data on advantages, physical properties, and typical applications are included. A price table sheet accompanies the brochure. *Bauer & Black, Division of The Kendall Co.*

10 HIGH VACUUM APPARATUS, an interesting and informative 56-page booklet, recently revised to include new-type vacuum connectors and couplings, contains detailed data on planning high-vacuum, system together with many valuable tables and charts. Also included is complete description of various types of high-vacuum apparatus and accessories. *Central Scientific Co.*

11 BARCO GASOLINE HAMMER. This multicolored bulletin describes applications for portable gasoline-powered hammers in factory maintenance and general construction fields. Typical applications include concrete breaking, asphalt cutting, ground-rod driving, rock drilling, and sheathing driving. Standard hammers deliver up to 1,700 strokes per minute with a gasoline consumption of approximately a quart an hour. *Barco Manufacturing Co.*

12 CENTRIFUGAL BLOWERS. Catalog B-10 describes these blowers in models to meet a wide variety of air-moving needs and includes descriptive material and dimension drawings on each model and complete air-delivery tables. *Hartzell Propeller Fan Co.*

13 TOOLS OF INDUSTRY, a new 68-page catalog, contains entire line of Williams tools with illustrations, descriptions, and complete information on each item. Products featured include carbon and alloy wrenches of all types, detachable sockets and accessories, impact sockets, tool holders, lathe dogs, and chain pipe tongs and vises. *J. H. Williams & Co.*

14 POWER TRANSMISSION EQUIPMENT is a 36-page catalog containing descriptions and list prices for complete line of Rockwood products, including vee belts, detachable link vee belting, pulleys, sheaves, roller chain, speed reducers, and other power transmission items. Catalog is profusely illustrated with helpful diagrams and charts and is bound in an attractive black and yellow cover. *Rockwood Pulley Manufacturing Co.*

15 BULLETIN 103-Z discusses steel tubes, stainless steel tubes, and welding fittings in stainless and carbon steel. Included are 10 photographs illustrating tube making process from laboratory to finished product. Specification charts are included on tubes and fittings. *Globe Steel Tubes Co.*

16 STEAM VACUUM REFRIGERATION, an 18-page bulletin, gives basic principles involved, and a description of range of operation and type of service for which steam vacuum refrigeration is best suited. Bulletin includes a varicolored cross-section chart showing surface condenser and barometric types. *Graham Manufacturing Co., Inc.*

17 A LOT OF THINGS BESIDES PUMPS. This 32-page booklet illustrates and describes plants and equipment manufactured by the worldwide Worthington organization. *Worthington Corp.*

18 CLOSE COUPLED PUMPS. This bulletin describes and illustrates features of A-C supporting-adapter type, close-coupled general-purpose pump in capacities to 2,500 g.p.m. at heads to 550 ft. Compact and requiring a minimum of space, the pump is available in a choice of packing or mechanical seal. *Allis-Chalmers Manufacturing Co.*

19 TYGON CORROSION-RESISTANT GASKETING. This four-page, two-color bulletin gives complete information on basic compositions and physical characteristics of Tygon gasketing. It tells where and how gasketing is applied, and discusses advantages and disadvantages of Tygon compounds over other gasketing materials. *U. S. Stoneware.*

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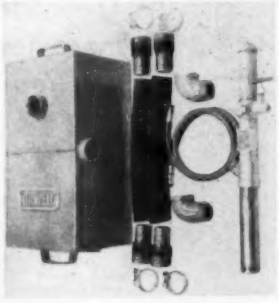
IT'S NEW CHECK IT

by Dan B. Miller

20 NEW AIR-OPERATED FLUID PISTON-ROD OILER fits all makes of slush pumps. Being air operated, the oiler needs no V-belts, chains, gears, or shaft extensions. It can be controlled from pump clutch valve. Air connections are arranged so that the pump oiler automatically operates when the pump clutch is engaged and shuts down when the clutch is disengaged. This high-capacity oiler will easily lubricate the fluid rods of as many as three slush pumps. The extra large volume of oil assures continuous lubrication, and washing and cooling of the fluid piston rods. Its compactness makes it adaptable to any type of drilling rig. It may be installed at the right or left of the pump, or can easily be installed between the skids within the pump cradle. The oiler is available in kit form, including all necessary parts for installation. *Oil Well Supply Co.*



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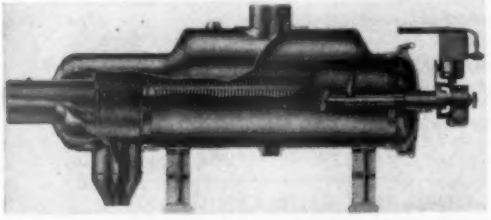
21 NEW JET-TYPE SELF-CLEANING FLUID PIPE-LINE STRAINER. Banks of rotating jets are arranged to clean the basket by hydraulic impact. One minute of this rotary scouring action, utilizing line product or water under high pressure, cleanses the basket and flushes the solids down the drain. The entire cleaning operation takes only 3 to 5 minutes. Monel wire-mesh screen reinforced by monel backup is used. Screens of any desired mesh may be used depending upon the degree of cleanliness desired in the product. Field performance data indicate that a 200-mesh screen will effectively remove most of the solids from the product. An additional strainer is installed in each manifold so that separate units can be cleaned without loss of capacity. A recording instrument which records the pressure-differential between the input and output lines of the trainer eliminates all guesswork as to when a dirty strainer should be taken off the line. The strainer need be opened only for occasional inspection or for installing a different mesh basket. Gage, recorder, selector, and starting switches are installed on a control panel. These strainers are made in both horizontal and vertical designs, in capacities of 10,000, 20,000, and 30,000 bbl. *Thornhill-Craver Co.*



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22 FOUR-CYCLE SPARK-FIRED GAS ENGINES. These engines, known as Types FSE-9 and FSE-13, are built with 9 and 13-in. bore sizes respectively in nonsupercharged, supercharged, intercooled-supercharged and Supairthermal types covering a range of 265 to 4,260 hp. Both types economically burn natural gas, butane, propane, manufactured gas, and sewage gas; and are convertible to 100 per cent fuel oil or Duafuel operation. Outstanding advantage is their high thermal efficiency. This efficiency ranges in excess of 41 per cent with the Supairthermal type engine, to 38 per cent with the nonsupercharged engine. Compression ratio can be selected to any desired value independent of the expansion ratio. These engines are well suited for pipeline pumping service, oil refining and production, industrial power plants, and oil-well drilling rigs. *Nordberg Manufacturing Co.*

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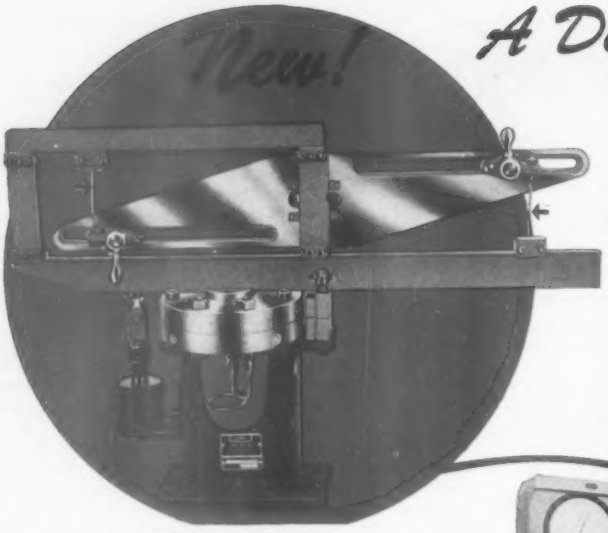

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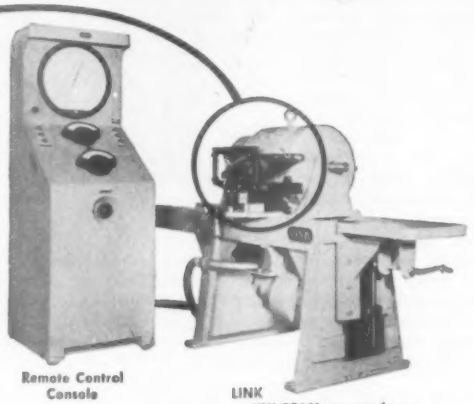

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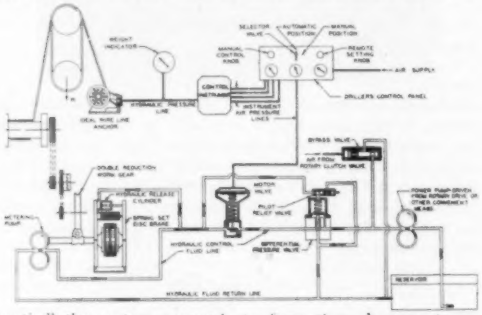
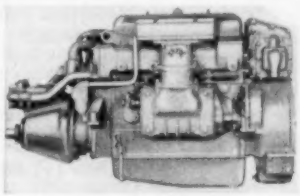
23 IDEAL MICROMATIC DRILLING CONTROL. An automatic feedoff control that will either maintain a predetermined weight on a drilling bit or feed off the drilling string at a predetermined rate of bit penetration can be supplied with new Ideal rigs of the larger sizes. It is also readily adaptable to existing rigs that have the conventional independently mounted hydromatic or dynamatic auxiliary brakes. The load on the drilling string is always under direct control of a simple mechanical brake, which is normally urged toward the "on" position. Any failure of the system automatically applies the brake, making it impossible to drop the drilling string. If the selector switch on the driller's control board is set on "automatic," the system responds to formation changes, translating these changes into whatever rate of feed is required to maintain any predetermined bit weight. If the selector switch is set on "manual," the control regulates the feedoff so that a predetermined and uniform drilling rate is maintained in accordance with the setting of the manual control knob. Weight of the drilling string is supported by draw-works drum. Drum rotation is controlled by a disk brake acting through worm gears and chain drive to the drum. The brake, being spring set, normally acts to hold the load unless force is applied to the hydraulic release cylinder, releasing the brake. The combination of the brake, metering pump, and hydraulic release cylinder is a speed-control device. The volume of fluid coming through the motor valve must pass through the metering pump, which is directly driven by the brake shaft with the following results: If the metering pump is not rotating fast enough to discharge the fluid to the return line, hydraulic pressure is increased in the release cylinder, which overcomes the spring tension applying force to the brake shoes. This reduction of force allows the speed of the brake shaft to increase to the point where the metering pump is returning fluid to the reservoir just as fast as the fluid is entering the system through the motor valve. If, on the other hand, the brake is rotating at such a speed that the metering pump returns fluid to the reservoir faster than fluid is supplied through the motor valve, the pressure in the hydraulic release cylinder is decreased. This allows the spring to apply additional force to the brake shoes, retarding the rotation of the brake disk. *The National Supply Co.*



IT'S NEW — CHECK IT

24 NEW 87-HP. MARINE PROPULSION DIESEL ENGINE was designed for small craft of 26 ft. and up. It is designated as the 4-51 model. The engine has four cylinders arranged in line with a total displacement of 216 cu. in. Both bore and stroke are 4.1 in. It develops 87 hp at 3,000 r.p.m. and has an output of 80 hp. at 2,500 r.p.m. with accessories. Its over-all length with direct drive and reverse gear is 49¼ in. Height measured from the centerline of the output shaft is 21¼ in. with an over-all height of 31 in. Its width is 26¾ in. with 22½-in. bolt centers. Weight with direct drive and reverse gear is approximately 1,400 lb. The 4-51 is a loop scavenged engine with both intake and exhaust valves and valve-operating mechanisms eliminated by the use of two sets of ports in the cylinder liners. A Roots-type blower forces air into and exhausts out of the cylinders through these ports. It has a pneumatic governor that weighs only 4 lb. and is entirely free of rotating parts. Its lubricating oil pump is of the rotor type and because it is built around and activated by the crankshaft the need for gear or chain drive is eliminated. The flywheel is located on the front end of the engine to provide better conformity with the hull and also to provide easier installation of a front-power takeoff. The engine has the greater flexibility, faster acceleration, and speed range desirable in crew-boat or work-boat installations. *Detroit Diesel Engine Div., General Motors Corp.*



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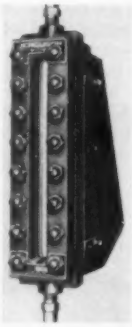


25 MERCURY VAPOR ILLUMINATOR permits instant and accurate gage readings of the boiler water level over longer distances, through dust particles in the air or deposits on the gage glass, or in poorly lighted areas. When a gage is equipped with this illuminator, the water column shows blue-green, topped with an intensely brilliant emerald green spot at the water level, to give an unmistakable water-level indication. The illuminator is designed to take full advantage of optical principles. It consists of a mercury vapor bulb enclosed in a steel housing, and a ballast box equipped for easy mounting at a convenient spot. The illuminator clips to the gage cover with two sets of brackets, making installation easy with no alterations to the gage. The illuminator is furnished in weatherproof construction suitable for outdoor use. It is made in sizes to fit standard gages and is also available with a 100 watt incandescent bulb for use on low-pressure steam service gages. *Jerguson Gage & Valve Co.*

IT'S NEW — CHECK IT

26 NEW 2000-MC MICROWAVE SYSTEM utilizes microwave radio and frequency-division multiplex equipment. The microwave carrier is divided into 30 voice channels or equivalent telegraphic functions (15 per voice channel) by the type FJ multiplexing equipment. The multiplexing equipment was designed specifically for use with the microwave equipment and provides maximum flexibility of arranging various combinations of services on the channels. The basic units of the type FR microwave radio

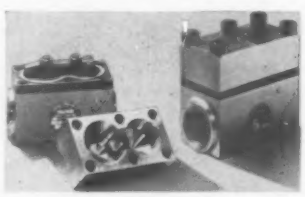
equipment are the same for both terminal and repeater station assemblies. Either type of assembly requires a single fixed rack or cabinet, and each is readily changeable from one type of operation to the other to facilitate system expansion. Complete point-to-point systems are offered, including all types of interconnected terminal equipment. This microwave system can be used by oil and gas pipeline companies, public utilities, and drilling and pipe-line contractors. *Westinghouse Electric Corp.*

IT'S NEW CHECK IT

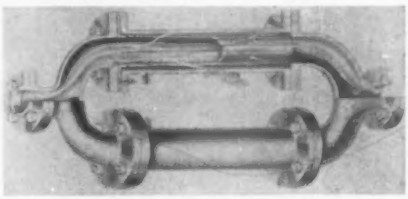
27 MODEL B-30-D CONDENSIFILTER. Compressed air of "instrument quality" is provided by dehydrating and filtering ordinary plant air in this new condensifilter. Made of wire mesh, to which flannel is securely attached, the filter cartridge has a radial fin design providing over 540 sq. ft. of filtering area. When the filter becomes dirty, the entire cartridge can be quickly replaced, thus keeping maintenance time to a minimum. The low cost of the disposable cartridge makes the unit economical to operate. The condensing unit is designed to provide the greatest possible heat-exchange area. As the air passes over the 400-sq. in. surface area of the condenser, its dew point is lowered to within 2° or 3° of the cooling-water temperature. A float-operated, snap-action trap is an integral part. Accumulated condensate is discharged through the trap valve, which is designed to prevent leakage or pressure loss even following long use. As the action is automatic, no attention is necessary to the condensifilter during operation. The rated capacity of the new model is 30 standard cubic feet per minute at 100 psig. Greater capacities can be provided by installing the required number of units in parallel. *Hankison Corp.*

IT'S NEW CHECK IT

28 HIGH-CAPACITY IMPULSE STEAM TRAP. An important feature of these traps is their ability to maintain high, even temperature in process equipment. Their small size and light weight make them particularly desirable where close-quarters piping is involved. For instance the 1½-in. size is 5½ in. long by 5 in. high by ⅔ in. wide and weighs only 14½ lb. Constructed throughout of stainless steel, they are designed to withstand the difficult operating conditions encountered in refineries, chemical plants, and other heavy-duty applications. New Series 50 traps have proved successful for condensate drainage on heat exchangers and stage heaters, reboilers, reheaters, stills, evaporators, debutanizers, polymerization, and gas stabilization units, dryers, and slashers. *Yarnall-Waring Co.*



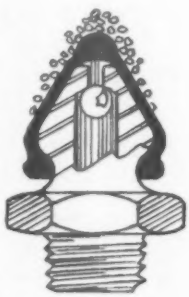
29 A NEW NONCHEMICAL WATER-TREATMENT PROCESS AND EQUIPMENT. This new water-treatment process and equipment called Hydrotron eliminates scale in heat-exchange equipment by changing water electrophysically, so that minerals contained in the water crystallize out in the form of a sludge or slurry. The sludge formed can be removed by the usual methods of blowdown.



Hydrotron equipment consists of a bronze pipe unit, installed in the water supply line, and an electrical control unit, mounted in a convenient position. There are no anodes to replace. The unit has unlimited life expectancy. Hydrotron is not a water softener. The water is not changed chemically but there is an electrophysical change that takes place after treatment, in which the process of nucleaction is affected. *Heller Laboratories.*

IT'S NEW CHECK IT

30 PROTECTIPS, a protective cap for Alemite fittings on all types of engines is a plastic cover which clamps snugly over the end of a grease fitting, keeping it free of dirt and grit. When servicing the engine the Protectip can be removed and new grease injected into the fitting. Since the fitting protected by Protectip is clean, no dirt or grit is carried into the bearing with the new grease. Protectips prevent clogging of grease fittings, prolongs the life of bearings and fittings and prevent damage from flying gravel. *Proco Co.*



IT'S NEW CHECK IT

31 SULFUR-FREE, SYNTHETIC LUBRICANTS FOR GAS COMPRESSORS. Called Ucon brand lubricants, they are produced in both water-soluble and water-insoluble series. These lubricants do not poison sulfur-sensitive catalyst, and they are remarkably resistant to the formation of varnish, sludge, or carbon. They are giving outstanding service in compressors handling hydrogen, nitrogen, hydrocarbons, air, and other gases. Many of the lubricants have low solubility in aliphatic hydrocarbons. Droplets of the water-soluble lubricants can be removed from compressed gases by water-washing. Ucon lubricants are polyalkylene glycols and derivatives. They are supplied with or without additives in a range of viscosities from 50 to between 60,000 and 90,000 S.U.s. at 100° F. These lubricants have high viscosity indexes, low pour points, and excellent lubricity. They are wax-free, nontoxic, and noncorrosive to metals. Lubricants that are practically water white are available for applications where color is important. *Carbide & Carbon Chemicals Co.*

IT'S NEW CHECK IT

PIPE LINES

Blow to Algonquin

Court upholds FPC denial of temporary certificate

BOSTON.—Federal Power Commission's ruling that it lacked jurisdiction to issue a temporary certificate of necessity to Algonquin Gas Transmission Co. to complete construction of its $44,000,000 natural-gas line from New York to southern New England has been upheld by the U. S. Court of Appeals here.

FPC ruled last October that it did not have the authority to issue a temporary permit to a company not already serving an area.

Algonquin's main line lacked only two welds, in Westchester County, New York, just a few hours' work, of being completed when work was halted. About 24 miles of lateral lines remained to be laid.

Hearings were resumed last Monday before an FPC examiner on petitions of Algonquin and Northeastern Gas Transmission Co. for permanent certificates to serve southern New England. These hearings have been under way intermittently since last November.

Algonquin had a permanent certificate, but this was set aside when Northeastern, supplier for north-central New England, contended that its application to serve the same area had not received proper consideration.

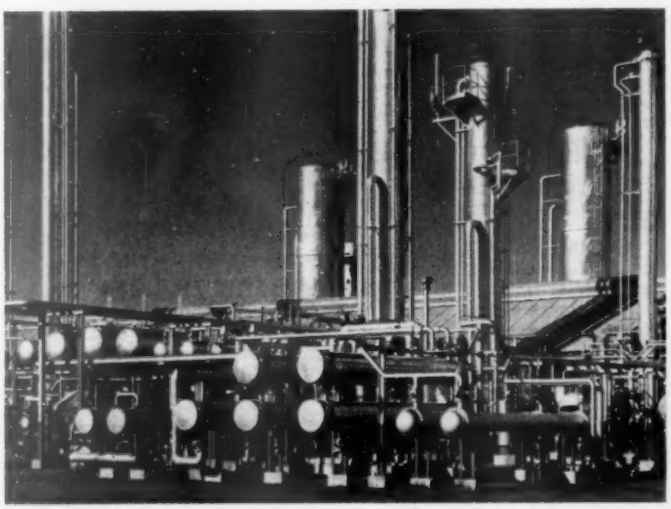
Algonquin's supplier is Texas Eastern Transmission Corp. Tennessee Gas Transmission Co. is the parent firm of Northeastern.

Another setback . . . Algonquin was dealt still another blow when the New York Supreme Court at White Plains ordered the company to take up about 2½ miles of 26-in. line it laid on the property of 11 landowners in Westchester County and restore the property to its original state.

The company originally received condemnation rights from the court July 10, 1952. When another court ruled that the certificate of convenience issued Algonquin by the Federal Power Commission was faulty, the New York court judge on December 9 vacated his July 10 order.

Pioneer Pipe Line Ships First Products to Salt Lake

SALT LAKE CITY.—Pioneer Pipe Line Co., owned 65 per cent by Continental Oil Co. and 35 per cent by Sinclair Pipe Line Co., has delivered its



Profitable Side Line

El Paso Natural Gas Co. operates several field-processing and gas-treating plants in conjunction with its gas-transmission activities. Pictured here are fractionators, absorbers, gas treaters, and heat-transfer equipment at the company's plant at Farmington, N. M., in the San Juan basin. Lean dry gas from the plant enters the lines to various consuming centers.

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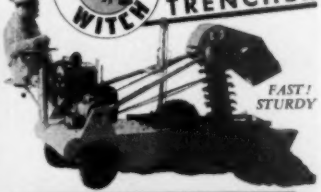

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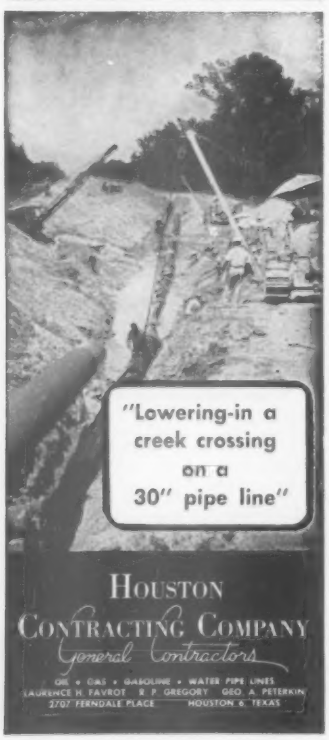
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first shipment of products at Salt Lake City through its new $8,000,000 line from Sinclair, Wyo.

The 300-mile, 8-in. line has a capacity of 12,000 bbl. daily.

The first shipment was No. 2 fuel oil from the 25,000-bbl. Sinclair Refining Co. plant at Sinclair.

Utah Natural Files With State Body for Extension

SALT LAKE CITY.—Utah Natural Gas Co. may extend its proposed gas-transmission line from Clear Creek gas field in eastern Utah's Carbon County to Provo, Utah, another 40 miles to this city.

Officials of the company told the Utah Public Service Commission that it wants to amend its application for the Clear Creek-Provo line to include the extension.

This would about double the formerly contemplated deliveries of about 50,000,000 cu. ft. daily.

Utah Natural now plans to carry about 50,000,000 cu. ft. daily to Mountain Fuel Supply Co. at Provo and another 50,000,000 through the extension to Mountain Fuel Supply at Salt Lake when and if the gas is needed.

The company figures it will cost it about $4,000,000 to lay the 57 miles of 18-in. over the Wasatch Mountains to Provo and another $2,400,000 to lay the extension.

Utah Natural has contracted with Three States Natural Gas Co. for its gas supply in Clear Creek. Two-thirds of the outstanding stock of Utah Natural was purchased late last year by El Paso Natural Gas Co. *(The Oil and Gas Journal, December 8, 1952, page 144).*

Trans Mountain Training Personnel in United States

VANCOUVER, B. C.—H. H. Anderson, vice president and general manager of Trans Mountain Oil Pipe Line Co., has revealed that training programs for Canadians who will take over senior positions with Trans Mountain are under way in the United States.

The men left Vancouver early this month for a 3-month study of pipeline and pump-station operations and maintenance in nine states. At the end of the 3 months, the men will take up duties along the 718-mile Trans Mountain line between Edmonton, Alta., and Vancouver. The line is scheduled for completion about the first of September and will go into operation in October.

Members of the senior group, together with former positions with oth-

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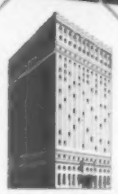

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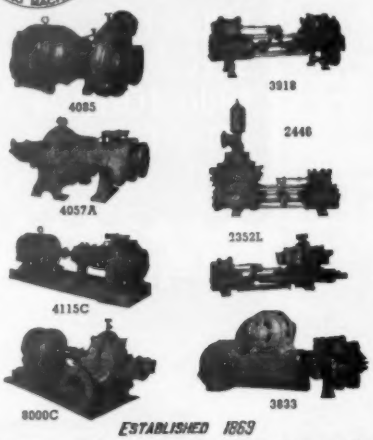

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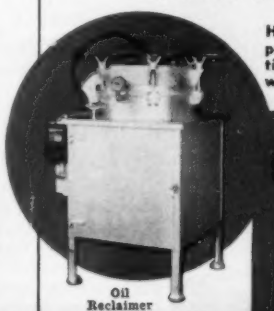

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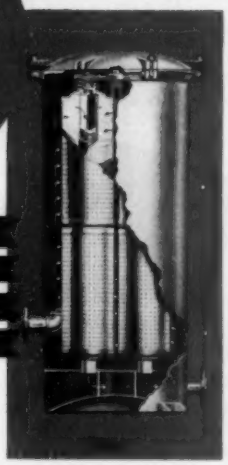

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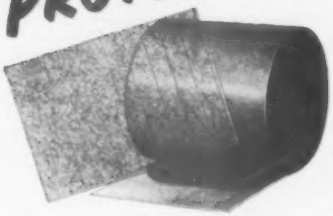

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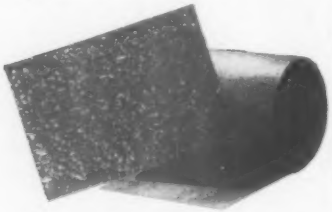

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Another group of eight men, slated for postions as terminal pump station or mechanical supervisors, will understudy skilled operators at tank farms and pump stations and will visit factories in St. Louis, Mo., and Portland, Ore., where diesel engines and pumps are being manufactured for the Trans Mountain line. Another group has just returned from a like trip, Anderson said.

Magnolia to Lay New Crude Line in Andrews County

DALLAS.—Magnolia Pipe Line Co. is scheduled to begin construction this week of a new 47-mile crude line in Andrews County, West Texas.

L. H. True, company president, said the line will originate in Nolley field in northern Andrews County near the Andrews and Gaines County line and extend to the new Magutex field. From Magutex it will run south through Midland farms to the southeastern corner of Andrews County where it will connect with the company's main line from Fullerton field to Midland Station.

The line will consist of 22 miles of 8-in., 11 miles of 6-in., and 14 miles of 4-in.

Work Under Way on Crude System Near McCamey, Tex.

McCAMEY, Tex. — McCamey Pipe Line Co. has begun construction of a new 25-mile crude-oil gathering system to hook up production from Brown & Tharp and Krasner fields in northern Pecos County with the new Rancho Pipe Line System at its pump station and tank farm here.

The system will consist of 14 miles of 4-in. discharge line and 11 miles of 2 to 6-in. gathering lines. Construction contract is held by Midland Contractors Co., and work is slated for completion by February 1. All needed material is reported either on hand or in transit.

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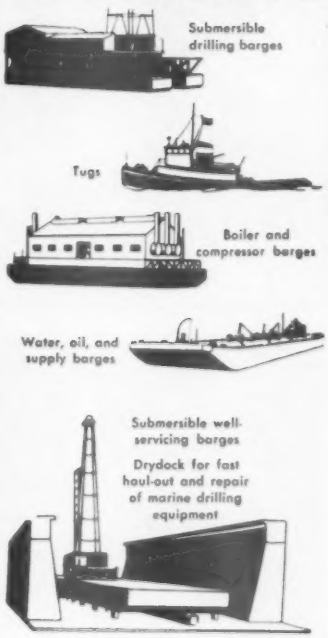
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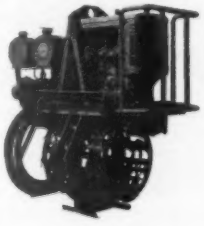

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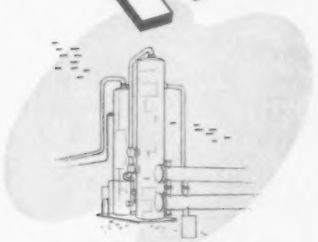

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REFINING

Pan-Am Southern Operating First Fluid Hydroformer

NEW ORLEANS.—The world's first commercial Fluid Hydroforming unit has been placed in operation by Pan-Am Southern Corp. at its Destrehan, La., refinery near here.

The unit has a charge capacity of 2,500 bbl. daily of heavy naphtha. It produces high-octane blending stock for manufacturing motor fuels or aviation gasoline.

The process was developed by Pan-Am's parent firm, Standard Oil Co. (Ind.), and M. W. Kellogg Co., which claim it is the first unit to use the fluid catalyst principle for hydroforming. Pan-Am's newest facilities circulates 27 tons of molybdenum alumina catalyst.

The unit's developers say it cuts construction and operating costs, turns out better product from the same quantity of feed, and simplifies operation and maintenance techniques.

Shallow Water Refining to Expand Refinery in Kansas

SHALLOW WATER, Kans. — Shallow Water Refining Co. has announced plans for an extensive expansion and modernization of its refinery here.

The project involves construction of a new 3,000-bbl. catalytic cracker and auxiliary facilities, plus enlargement of an existing catalytic polymerization plant.

Current rating on Shallow Water's refinery is 4,000 bbl. per stream day on crude oil, 1,300 bbl. per day of thermal cracking. Among the plant's other major units is a 1,500-bbl. Cycloversion unit.

Needed Butadiene Capacity Assured to Meet NPA Goals

WASHINGTON. — The National Production Authority has announced that sufficient additional facilities have been assured to meet its expansion goal for butadiene and a number of other chemical products.

The NPA reported that new facilities are being developed through rapid tax amortization and unassisted expansion to increase the output of butadiene from 61,000,000 lb. a year as of January 1, 1951, to 162,000,000 lb.

The expansion goal of 1,210,000,000 lb. of styrene monomer and methyl styrene, representing an increase in capacity of 584,000,000 lb. over the 626,000,000 lb. available 2 years ago, and the target of 2,320,000,000 lb. of carbon black, an increase of 800,000,000 lb. over the 1951 capacity of 1,520,000,000 lb., also will be reached in full.

The expansion program for tetraethyl lead chemicals, however, is only two-thirds assured. This program calls for an increase of 290,000,000 lb. a year to bring the 1951 capacity of 550,000,000 lb. up to 840,000,000 lb.

Sunset Installing Thermal Cracking Unit at Torrance

LOS ANGELES.—Work is progressing on the installation of a 2,800-bbl. thermal cracker at Sunset Oil Co.'s Torrance refinery.

The $1,000,000 expansion program, which will not affect crude throughput of the plant, also provides for construction of a 100-bbl. polymerization and hydrogen sulfide removal unit.

M. A. Sterling, Sunset vice president, said the cracker now being installed at the refinery originally was owned by the former Eagle Oil & Refining Co. at Santa Fe Springs, Calif. The cracker was torn down, reengineered, and expanded.

The Torrance refinery has a crude-charge capacity of 10,000 bbl. daily. This will be its first cracking unit.

Avgas Producers Seeking Codimer, Butylene Polymer

WASHINGTON. — Aviation - gasoline producers are being aided by the Petroleum Administration for Defense in lining up supplies of codimer and butylene polymer to take the place of butylenes which have not been needed by the Reconstruction Finance Corp. since last fall but will now be required for increased synthetic-rubber production.

The first 1,800 bbl. a day installment of the 2,800 bbl. daily which has been available is to be returned to the RFC January 20 and the remaining 1,000 bbl. shortly thereafter.

PAD is rounding up supplies of codimer and polymer from motor-gasoline refiners in District 2. Its use will result in a somewhat higher cost of aviation gasoline because of the expense of railroading it to plants in District 3.

The 2,800 bbl. daily of butylenes is covered by contracts RFC holds with producers. Because it was not needed

WILMINGTON, CALIFORNIA. The Crude Distillation and Vacuum Flashing Unit recently added during Union Oil's $26½ million refinery expansion program at Wilmington was designed, engineered and constructed by the Fluor Corporation, Ltd. Fluor also built many of the offsite facilities and interconnecting pipelines within the specified time and allocation. This is another example of Fluor's ability to handle any phase of petroleum refining, large or small. Fluor's record of achievements in designing and erecting facilities for gasoline recovery, gas treating and transmission, for the processing industries and the production of petrochemicals is also universally recognized.

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for rubber at the time, RFC let PAD have it, but rubber output now is being speeded up and the corporation, which also is reopening several alcohol-butadiene lines, is now calling for its return.

W.P.R.A. Schedules Five Regional Meetings for 1953

NEW YORK.—Five regional technical-industrial relations meetings will be sponsored during 1953 by the Western Petroleum Refiners Association.

These will be in addition to the association's annual meeting scheduled for San Antonio, March 23-25.

The regional meetings will be held February 12-13 at Hotel Beaumont, Beaumont, Tex.; May 28-29 at the Broadview Hotel, Wichita; June 18-19 at the Conrad Hilton Hotel, Chicago; September 24-25 at Hotel Henning, Casper, Wyo.; and October 22-23 at the Garrett Hotel, El Dorado, Ark.

No registration fees will be collected and attendance is not restricted to association members.

Refining Briefs

Western States Refining Co. is stepping up crude-oil capacity of its North Salt Lake City refinery. New facilities which are now under construction will add 1,000 bbl. daily to the refinery's present capacity of 2,000 bbl. per day.

Completion date for the new Platformer now being built for Taylor Oil & Gas Co. at its Corpus Christi refinery is set for August 1953. Taylor's Corpus Christi plant currently is rated at 40,000 bbl. per stream day. The refinery is equipped with cat cracking facilities rated at 10,000 bbl. daily. Other major processes now in service include cat polymerization, thermal cracking, and visbreaking.

Crude-oil capacity of Husky Oil Co.'s Cody, Wyo., refinery is being stepped up from 5,000 to 6,000 bbl. per stream day. The new capacity is scheduled to go into service later this year. Husky's current modernization program includes a 3,000-bbl. per day vacuum unit, a 1,000-bbl. per day cat reformer, and desulfurization facilities.

Engineers for Champlin Refining Co. currently are considering installation of catalytic reforming facilities at the company's Enid, Okla., refinery. Champlin's 20,000-bbl. refinery now operates with thermal reforming and cracking. The refinery is among Oklahoma's larger lube-oil producers.

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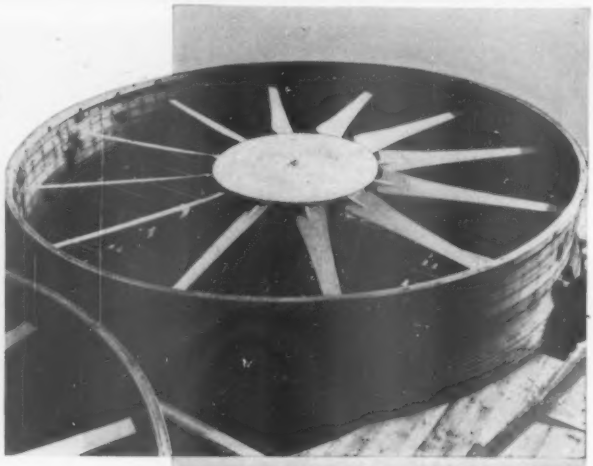

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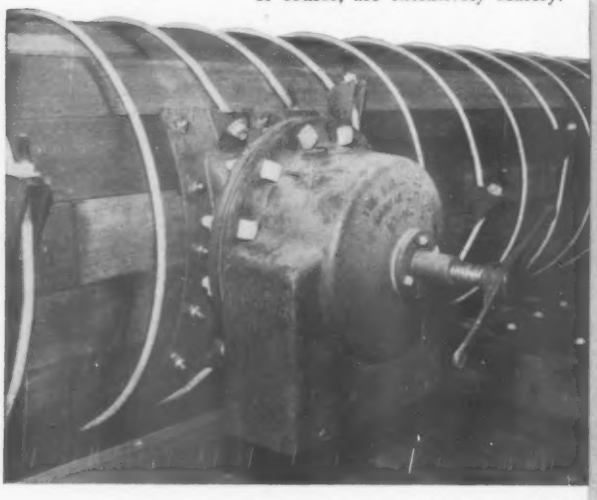

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NATURAL GAS

Northern Contends It Did Not Violate FPC Directive

WASHINGTON. — Northern Natural Gas Co. told the Federal Power Commission last week it has not violated FPC orders by selling its gas wells and leases to a subsidiary, Northern Natural Gas Producing Co., because it still controls the gas reserves. Also that FPC had no authority to impose such a condition anyhow.

FPC last summer approved an application by Northern to expand its transmission capacity from 600 to 825 million cubic feet of gas daily on the condition that the company should not dispose of its reserves without prior approval of the commission.

Shortly thereafter, Northern transferred its wells and leases to the producing subsidiary.

The reaction during the early part of the current hearing of the utility companies served by Northern was varied. Lloyd Marti, Central Gas & Electric Co., Lincoln, told the commission that revocation of Northern's certificate would not be in the public interest. He said the commission has other ways to enforce its orders.

Spokesmen for Iowa Power & Light Co., Des Moines, said the gas reserves in question are just as firmly committed to the expansion program as before the transfer of the producing properties.

Ray Smith, Council Bluffs Gas Co., Council Bluffs, Iowa, said the commission should find that Northern had violated the order.

P. L. Farnand, Minneapolis Gas Co., said FPC should apply for a writ of mandate ordering Northern to carry out the commission's order. This, he said, would prevent the company's utility customers and household users from suffering during legal proceedings.

Ray Fish Wins Support of Tacoma, Wash., Gas Utility

OMAHA. — Representatives of two rival pipe-line companies met here early this month to argue for a market, and Pacific Northwest Pipe Line Corp., represented by Ray Fish, Houston, apparently emerged triumphant.

The unusual meeting saw Fish and two representatives from Stone & Webster, New York management consultant firm, present opposing arguments for supplying gas to the Pacific Northwest. The audience was the president and two directors of Washington Gas & Electric Co. of Tacoma, Wash. Fish supported his plan to serve the area by means of a 1,300-mile trunk line he proposes to build from gas fields in the San Juan basin in New Mexico. His opponents argued for gas supply from fields in Alberta, Canada.

The officials of the Tacoma company reported reaching an agreement with Fish, indicating they would prefer gas from the Southwest.

The Houston contractor has been waging an active campaign in the Northwest for support of the gas-utility companies. So far, it appears to have been more than just a little bit successful. One of his first moves was to buy Spokane Gas & Fuel Co. from Cities Service Co. for a sum reported in the neighborhood of $1,000,000 *(The Oil and Gas Journal, January 21, 1952, page 132).*

Off the record, many officials think that chances that Fish will build the line to the Pacific Northwest are good. A final decision on the area's gas supply is not expected until after the all-important Federal Power Commission hearing February 16.

Other firms which propose to serve the same area are Northwest Natural Gas Co., New York; Westcoast Transmission Co., Wilmington, Del.; Glacier Gas Co., Butte, Mont.; and Trans-Northwest Gas, Inc., Spokane.

Ohio Fuel Gas to Spend $25,000,000 for Expansion

COLUMBUS. — Allan W. Lundstrum, president of Ohio Fuel Gas Co., an affiliate of Columbia Gas System, announced plans for a $25,000,000 expansion by Ohio Fuel Gas this year.

In his annual report, Lundstrum said the company spent $21,000,000 last year and more than $100,000,000 in the last 6 years. Since 1946, he said, the company has increased its annual gas deliveries by 93 per cent and extended gas service to 94,000 new customers.

Lundstrum said Ohio Fuel had 90,000,000 cu. ft. of gas in underground storage at the beginning of the current heating season in five storage areas through the state.

El Paso Hikes Gas Rates By $15,287,000 Annually

WASHINGTON. — A $15,287,000 annual hike in natural-gas rates proposed by El Paso Natural Gas Co. has been allowed to go into effect as of January 1 by the Federal Power Commission.

The increase, however, was subject to the posting of a $1,500,000 bond by the company and to refund of any amounts which the commission subsequently may disallow. Under the Natural Gas Act, a suspended rate increase may go into effect under bond if proceedings on the application are not concluded in 5 months.

Customer companies affected by the increase are Southern Counties Gas Co. and Southern California Gas Co., Los Angeles, and Pacific Gas & Electric Co., San Francisco.

Southern Counties Gas was allowed to place a suspended $495,000 increase in wholesale rates in effect January 1 after posting a $50,000 bond with FPC.

P. G. & E. Allots $32,000,000 For Expansion of Gas Syseem

SAN FRANCISCO.—Pacific Gas & Electric Co. has allocated about $32,000,000 for expansion of natural-gas pipe lines and other facilities this year.

James B. Black, P. G. & E. president, said work is under way to expand capacity of the company's line delivering gas from the Arizona border from the present 400,000,000 cu. ft. to 550,000,000 cu. ft. daily. The company has asked the Federal Power Commission to approve further expansion of the line to carry 700,000,000 cu. ft. daily.

P. G. & E., like the two southern companies, Southern California Gas Co. and Southern Counties Gas Co., both of Los Angeles, is supplied with gas by El Paso Natural Gas Co., El Paso.

Phillips-Case Appeal Again Taken Under Advisement

WASHINGTON. — The Court of Appeals again took under advisement last week requests that it order the Federal Power Commission to reverse its ruling that it does not have jurisdiction over natural-gas rates charged by Phillips Petroleum Co.

The case was taken under advisement originally last December, but arguments had to be heard again when one of the three judges hearing the case disqualified himself.

The appeal was taken by the State of Wisconsin and the cities of Kansas City, Detroit, and Milwaukee over an issue arising in 1951 when the Federal Power Commission declared it did not have jurisdiction over producers and gatherers of natural gas, thus exempting Phillips from regulation.

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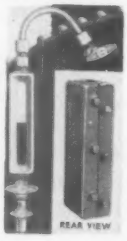

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Among the Drilling Contractors

California Contractor Drills 90 Wells in 1952

Brown Drilling Co., Long Beach, Calif., drilled more than 90 wells during 1952. Footage totaled 373,960 ft., an average of 4,144 ft. per well. Seven rigs were used, all of which were kept in almost continuous operation through the year. Operations were mainly in California and West Texas.

Wells drilled by this company now exceed 830 with an aggregate footage of 3,158,000 ft., averaging 3,800 ft. per well.

B. G. Byars, Tyler, Tex., is drilling on a contract with L. A. Greiling, also of Tyler, at a wildcat location 2 miles west of Jacksonville, Cherokee County, eastern Texas. Location is for 1 Ragsdale, in the Jose Pinda Survey.

Gibson Drilling Co., Dallas, has a rig working for McAlester Fuel Co. at a wildcat location 10 miles south of Henderson, Rusk County, eastern Texas. The operation is listed as 1-A Alexander. Location is in the George May Survey.

Penrod Drilling Co., Shreveport, has a contract from Pure Oil Co. for a McFearin sand test to be drilled ¾ mile southeast of the Hico-Knowles field, in Lincoln Parish, northern Louisiana. Location is for 1 Barham, in 31-20n-3w.

Barnwell Drilling Co., Shreveport, has a new operation under way for Garson Reiner in the Southeast Ashland field, 2 miles southwest of the Ashland townsite, Natchitoches Parish, Louisiana. Hole is projected as a Rodessa test. Location is for 1 Hood, SE NE SW 7-13n-7w.

New Cable-Tool Firm

Universal Operating, Inc., is a recently formed cable-tool contracting firm in the tri-state area of Illinois, Indiana and western Kentucky. Headquarters are at Evansville, Ind. Principal owners are K. R. Ingle, president; and W. E. Moser, vice president. Ben Elbert, Princeton, Ind., is tool pusher.

Penrod Drilling Co., Shreveport, is drilling for Union Oil Co. of California at a newly started wildcat test 9 miles east of Marksville, in Avoyelles Parish, southern Louisiana. Hole is projected to 7,000 ft.

Bryant-Hayward Drilling Co. has the contract for Ashland Oil & Refining Co.'s second well in the area 5 miles east of Orlando, in Logan County, Oklahoma. The new operation, for which rig has been moved in, is ½ mile east of the first well, recently completed Misener sand discovery well with pay around 5,635 ft. Location is on the operator's Henke lease in the NW NW SE 1-19n-3w.

On the rig floor at Texas Gulf Coast Producing Co.'s new Ellenburger discovery well, located 4 miles northeast of Odessa, in Ector County, West Texas, and drilled by Exploration Drilling Co., Snyder, Tex. Left to right: L. C. Finley, L. A. Townley, G. L. Brewer, H. D. Billups, and Henry Yancey (driller), day-tour crew for the contractor; and W. G. Whisnand, geologist for the operating company. The picture was taken just after the well had reached its total depth of 13,313 ft.

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Stout Drilling Co., Shreveport, is contractor on a shallow wildcat test which Lee Spencer and associates are starting at 2-A Porter estate, C SW SE 23-12n-13w, 2 miles southeast of the Mansfield townsite, DeSoto Parish, Louisiana.

Woolf & Magee, Tyler, Tex., will drill a 9,750-ft. test for Southwest Gas Producing Co. at a wildcat location 1¼ miles northwest of the Ruston field, in Lincoln Parish, northern Louisiana. The test, 1 Payne, spotted in 10-19n-3w, is projected to the Cotton Valley horizon.

Bennett Drilling Co., cable-tool contractor, has a 2,800-ft. wildcat test under way in Sequoyah County, far-eastern Oklahoma. Hole is being drilled under contract for Russell Cobb, Jr., of Tulsa. Location is in the SE SE SE 26-12n-22e.

Wheless Drilling Co., Shreveport, has a contract with Union Producing Co. and associates for a deep test to be drilled 1¾ miles southwest of Liberty Hill, in Bienville Parish, northern Louisiana. Location is 3¼ miles east of the Luck field, nearest production. It is for 1 Allison, 2-15n-5w.

Noble Drilling Co., Tulsa, has a new 12,000-ft. test under way in Iberia Parish, Louisiana Gulf Coast, where it is drilling for Samedan Oil Corp. of Ardmore, Okla. Location is for 1 Jeanerette, in 10-12s-10e.

Kemp Drilling Co., Shreveport, is drilling for Hunt Oil Co. and others at a wildcat location 2 miles north of the Ross Bayou field, Concordia Parish, Louisiana. The test, 1 Thomas and associates, is located in the C NW SE 28-7n-7e. Hole is projected to 6,500 ft.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 1-12-53	Change week ended 1-5-53	Change week ended 1-14-52
Gulf Coast	607	−26	− 44
N. & W. Tex.-N. M.	799	−10	−246
Ark.-N. La.-E. Tex.	138	− 1	− 48
Oklahoma	328	−14	− 29
Kansas-S. Nebraska	162	+ 3	− 5
Illinois-Eastern	97	−18	+ 36
Rocky Mountains	222	− 9	+ 64
Pacific Coast	184	+ 4	+ 9
Total U. S.	2,537	−71	−263
Western Canada	168	+ 1	+ 1
Total	2,705	−70	−262

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 182 and 183.

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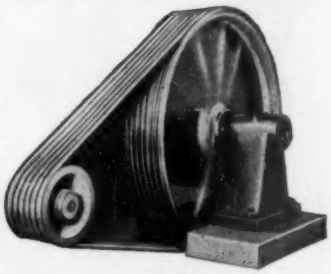

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REPORTS ON

Exploration and Drilling

Wildcats Check Future Province

ONE promising wildcat area currently receiving accelerated interest is that which lies west and southwest of the east-west trending, shallow Permian oil fields of northeastern Eddy County, New Mexico.

Five wildcats are active in this area. Because of the rapid changes in structure and stratigraphy which characterize this area, each of the wildcats might be considered as checking a separate "province."

At A on the map is West Coast Hydrocarbons 1 Black Hills unit, SE NW 28-17s-20e. This wildcat, a projected 5,000-ft. Permo-Pennsylvanian test, is changing to rotary at 3,740 ft. (Due to circulation problems, the Permian-San Andres throughout this area is normally penetrated with cable tools.) Location for the test was made following surface mapping and subsurface studies. The same anticline has previously been tested by two stratigraphically deep dry holes.

The wildcat at B on map is Kewanee Oil Co. 1 Four Mile unit, SE NW 26-18s-18e. This Ellenburger test has the Silurian-Fusselman as its principal objective. It was located on the basis of surface and subsurface studies. Preparations are being made to drill ahead with rotary from 1,150 ft.

Southeastward from Kewanee's well lies an area that should prove rich in wedgeouts of Pennsylvanian, Mississippian, Silurian, and Ordovician rocks. Here the Pennsylvanian appears especially attractive because approximately 3,600 ft. of section, including intervals of sand, is lost northwestward across the area.

Recent drilling indicates that the Huapache monocline represents basement movement of considerable displacement in the vicinity of the Texas Hill anticline (arrowed on sketch). The entire Pennsylvanian section of approximately 4,100 ft. is missing from the crest of the structure. It is believed by some that the east side is the downthrown side of the apparent fault and the east flank may be tested this year.

On east from the Texas Hill anticline toward the acceptable northern limit of the Delaware basin, the Permian joins the list of potential reservoir rocks. Three wells are currently checking this portion of the possible future petroleum province, each in a different geological environment.

At E on map is United States Smelting, Refining & Mining Co. 1 Kelly-Federal, SW SE 10-23s-23e, which is cutting reef material below 920 ft. in the buried San Andres-Victorio Peak (?) reef zone. Basinward from this reef zone, at D on map, is Stanolind Oil & Gas Co. 1 Guadalupe Foothills unit, SE SE 20-22s-25e. This wildcat is changing to rotary at 938 ft. Another Stanolind well in the same general area, but updip from the Permian reef zone, is 1 Lakewood unit at C on map, NE SE 34-19s-25e, a Fusselman test. This wildcat topped the Mississippian at 9,870 ft. and is now drilling below 10,020 ft. toward a projected depth of 10,500 ft.

Northwestward from this area, potential reservoirs are again limited to pre-Pennsylvanian rocks, which were truncated prior to deposition of Pennsylvanian sediments. Just off the northwest corner of Eddy County, Permian rocks lie directly on pre-Cambrian.

Throughout this little-known area the deepest objective formations are at economically attractive depths. It's a hard-to-work area, however, because primary objectives are stratigraphic traps. Stratigraphic-trap hunting with but a few wells for guides requires real intestinal fortitude.

Philip C. Ingalls.

For a discussion of the petroleum possibilities of Chaves and Eddy counties see Phil D. Helmig's article in the October 20, 1952, issue of the Journal.

Sketch based on map furnished by R. A. Broomfield, Jr., Artesia, N. M., who also supplied notes on activity and geology for this article.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WYOMING . . . Big Horn-Powder River Corp. and J. D. Sprecher 1 Mary Wakeman, NE NW NE 1-42n-66w, in the Wildcat Creek area, Weston County, flowed 589 bbl. of oil in 12 hours for the most important discovery on the east side of the Powder River basin in the past year.

UTAH . . . Continental Oil Co. has completed the Chapita Wells wildcat, SE SE NW 16-9s-23e (SLM), Uintah County, for an initial potential of 62 bbl. of oil in 4 hours from the Mesaverde sand. This is the first commercial completion from the Mesaverde in Utah.

NORTH DAKOTA . . . Amerada Petroleum Corp. is coring and testing at an important extension 3 miles east of production at Tioga field at 1 Rice, C NE NW 23-158n-94w, Mountrail County, after the well found Charles salt at 7,595 ft. and Madison at 8,164 ft. A possible commercial producer has been indicated by drill-stem tests at the well.

WEST TEXAS . . . Late report on Texas Gulf 1 Headlee, Ellenburger discovery northeast of Odessa, gave the well a completion gage of 643 bbl. of 51°-gravity oil a day from open hole at 13,106-13,313 ft.

This is under no circumstances to be construed as an offering of these securities for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such securities. The offer is made only by means of the Prospectus.

NEW ISSUE

$101,758,900

SINCLAIR OIL CORPORATION

3¼% Convertible Subordinated Debentures

Dated January 15, 1953 — Due January 15, 1983

(to bear interest from January 26, 1953)

Convertible into Common Stock at $44 per share on or before January 15, 1958 and at higher prices thereafter, such prices being subject to adjustment under certain circumstances.

The Company is offering these Debentures for subscription to the holders of its Common Stock, to whom Subscription Warrants are being issued as more fully set forth in the Prospectus. The Warrants will expire at 3:30 P.M. Eastern Standard Time on January 26, 1953.

Subscription Price 100%

During and after the subscription period, the several Underwriters may offer Debentures, all as more fully set forth in the Prospectus.

Copies of the Prospectus may be obtained from the undersigned only in those States in which the undersigned may legally offer these securities in compliance with the securities laws of the respective States.

Smith, Barney & Co. — Merrill Lynch, Pierce, Fenner & Beane

The First Boston Corporation — Union Securities Corporation — Blyth & Co., Inc.

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January 12, 1953

Canadian Fields

New Year Off At Record Rate Of Success

CALGARY.—The Canadian oil and gas industry has started 1953 operations with a record rate of success, as four wells were chalked up as oil discoveries and one found some oil encouragement, during the initial nine days of the year. All the new strikes so far during this year have been made in Alberta, Canada's leading oil province.

This rate of discovery, nearly one new find each two days, compares almost equally with that of 1952. Later during the year, as exploration companies further expand their program, and particularly during the summer months, when activity is expected to be at its peak, it is anticipated that the discovery rate will be further increased.

The new oil discoveries so far in 1953 came in the following areas of southern and central Alberta: Ewing Lake, Garrington, Legal and Malmo (North). The oil showing was obtained at a wildcat in the Rimbey region.

The Ewing Lake strike was made at Canadian Gulf's wildcat, in LSD 14, 23-37-21w4, 5 miles east of Stettler Devonian oil wells, 90 miles northeast of Calcary, and in a region where seven other oil discoveries had previously been made (six by Gulf and one by Merrill-Mitmor-Merland group). The Ewing well encountered its oil in the D3 zone of Devonian, flowed 29.3°-gravity crude at rate estimated at 30 bbl. hourly, and found 13 ft. of water-free pay zone which was topped at 5,509 ft. Surveys were being completed this weekend, and string of casing will be set for production tests.

Near the Garrington post office, 12½ miles northwest of Oldstown, Shell Oil Co. chalked up discovery of 36°-gravity oil in an as yet unspecified formation below the Cardium contact. This well 1 Westerdale, LSD 10, 4-34-3w5, is 17 miles northwest of the company's Old No. 1 gas discovery, 50 miles north-northeast of Shell's Jumping Pound wet gas field and 30 miles northeast of the Winchell Coulee discovery in the Foothills region. Drill-stem test in the productive horizon, at 6,813 ft., gave up a moderate gas flow and 510 ft. of light crude oil. Hole is being deepened for lower objectives.

In the Legal area, some 20 miles due north of Edmonton, Imperial Oil, Ltd., has chalked up a new Viking oil pool discovery at its exploratory driller 2½ miles east of other oil producers in that area. This well, Imperial 6-13, LSD 6, 13-57-25w4, found its oil at around 2,765 ft., and now has production casing set for completion tests.

The other Alberta find is a shallower oil pool discovery in the North Malmo area, where an extension venture encountered oil in the basal quartz section of the Lower Cretaceous. This well, Marwayne-Dragon 1-26 Malmo, LSD 1, 26-44-22w4, on farmout from Hudson's Bay Oil & Gas Imperial, flowed oil during drill-stem test 4,568-73 ft. A small non-commercial oil showing was also found in the Poplar section of the Cretaceous, a formation that is productive 1½ miles to the south, and hole is now heading down into its Devonian objectives.

At Rimbey, the joint California Standard and Canadian Gulf wildcat 11-3 Rimbey, LSD 11, 3-42-2w5, found slight oil encouragement in the D2 Devonian. One-hour test of a 26½ ft. interval to 7,557 ft., flowed natural gas in small volume, and yielded a recovery of 200 ft. of oil and gas-cut mud.

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Hole is now being deepened of oil and gas in lower Devonian zones.

ALBERTA SUCCESSFUL WILDCATS

Mid Western-Selbay 10-30 Buffalo Park, LSD 10, 30-44-8w4, TD 2,581 ft.; Viking gas well.

Mitmor 5-1 Merrill & Associates, LSD 5, 1-39-21w4, TD 5,409; D3 Devonian oil well.

British Empire 2-2 Ranchmen's, LSD 2, 2-35-9w4, TD 2,994 ft.; Viking oil well.

Stanolind-Imperial-St. Albert 1 Unit LSD 3, 1-54-26w4, TD 4,743 ft.; D3 Devonian oil well; IP 1,328 bbl. per day.

ALBERTA WILDCAT FAILURES

Trinidad 1 Calvin 33-10 Sancroft, LSD 10, 33-31-9w4, TD 3,974 ft.

Blue Crown Petroleums 2, LSD 6, 22-55-25w4, TD 4,540 ft.

SASKATCHEWAN SUCCESSFUL WILDCAT

Socony-Western Prairie 25-9B Webb, LSD 9, 25-15-17w3, TD 3,328 ft.; Cretaceous oil well.

SASKATCHEWAN WILDCAT FAILURES

Sohio-Standard 1 Horizon, LSD 16, 5-7-24w2, TD 6,031 ft.

Britalta 1 North Cabin, LSD 16, 25-47-2w3, TD 2,480 ft.

Sohio-Baysel 14 Quill Lake, LSD 1, 28-36-18w2, TD 2,040 ft.

Canadian Devonian & Associates-Sohio 1 Watrous, LSD 11, 15-31-27w2, TD 2,373 ft.

BRITISH COLUMBIA WILDCAT FAILURE

Pacific 1 Cecil Lake, LSD 4, 11-85-17w6, TD 6,967 ft.

EASTERN CANADA

Ontario.—Acreage in Grey County north of the Rocky Saugeen and west of No. 6 Highway has been secured by the Maracarden Oil Co. of Toronto under 10-year lease, subject to automatic cancellation if drilling is not undertaken within 18 months. The Toronto company became interested in the territory, about 5 miles north of Durham, after studying geological maps prepared by the Saugeen Valley Conservation Authority. An unnamed Alberta company has leased acreage on similar terms in Normandy Township, for approximately 2 miles on each side of Ayton village. The Trenton limestone, at comparatively shallow depth, is thought to be the most likely producing horizon.

James Bay.—In the James Bay area of northern Ontario, Overland Industries, Ltd. of Edmonton has secured drilling rights on 13,000 square miles east of Moose River Crossing and is preparing to start development work this year. The company is headed by Richard P. Taylor, and the area was inspected by Col. Lloyd W. Nelson accompanied by Hon. P. T. Kelly, minister of mines, and Dr. G. W. S. Savage, government geologist for northern Ontario. Three government tests drilled in recent years obtained considerable information regarding the structures, which has been made available to the company. There have been unconfirmed reports of oil seepages. The James Bay area comprises some 62,000 square miles underlain with paleozoic rocks, similar to the southwestern Ontario oil-bearing formations, and on the basis of the area and the geological information obtained, it is thought possible though by no means certain that oil reserves of around 400 million barrels may exist. Mines Minister Kelly has for some months past been endeavoring to interest substantial capital in the development of the area, it being recognized that owing to transportation and other difficulties development will be very costly.

Mississippi

Final 1952 Wilcox Strike Completed In Adams

JACKSON. — In southwestern Franklin County, Mississippi, the B. Serio-R. J. Bartlett 1 Hattie Bauer, Section 30-5n-1e, has been completed on pump for the final Wilcox discovery for 1952. Completion is from perforations 6,356-62 ft. opposite Wilcox sand. On potential test this discovery well pumped at the rate of 175 bbl. of 37.5°-gravity oil per day plus 20 per cent b.s. and w. This discovery is located approximately 800 ft. east and slightly north of same operator 1 Cobb, dry hole, which had several shows of oil but was abandoned as a dry hole.

In northwestern Adams County, Mississippi, another possible Wilcox discovery is being tested at the D. Gammill-L. Cashion Co. 1 Ida Stowers et al, Section 8-8n-2w. This test was drilled to total depth of 6,617 ft. in the Wilcox. Sidewall cores at 5,637 through 5,741½ ft. carried shows of oil. Casing was run to 5,691 ft. and perforated 5,637-38 ft. At last report the well was being cleaned to pits at the rate of 65 bbl. of oil and 5 per cent wash water per day through 8/64-in. choke with tubing pressure 165 psi. This test is located approximately 2,000 ft. northeast of the Humble 1 Stowers, and 1-A Stowers, dry holes, which were drilled in 1944. Both wells carried shows in this zone of the Wilcox. Subject test is approximately 7 ft. higher structurally on the sand.

In northwestern Jefferson County, Mississippi, The Atlantic Refining Co. 1 Phillips et al, Section 10-10n-2w, was perforated 9,554-58 ft. in Lower Cretaceous and tested only slightly gas and brackish water-cut mud. Plug was set above these perforations, and casing was perforated 9,200-04 ft. opposite shows in Lower Tuscaloosa sand. On drill-stem test this wildcat flowed at the rate of 150 to 175 bbl. of 43.5°-gravity oil per day plus 10 to 12 per cent salt water through ¼-in. bottom and 13/64-in. top chokes with top pressure 1,250 psi. These perforations were squeezed with 120 sacks of cement and same interval was reperforated with 32 jet shots.

Gulf Refining Co. has opened a new deep pay horizon producing high gravity oil in Baxterville field of Lamar County, Mississippi. New high-gravity pay discovery is the company 25 J. M. Andrew SE SW Section 6-1n-16w. Well was completed flowing at the rate of 160 bbl. of 40.9°-gravity oil per day through 12/64-in. choke. Gage was based on an 11-hour test. Flowing top pressure was 400 psi. and gas-oil ratio 500-1. Production is from an unidentified zone of Lower Cretaceous which was perforated 10,821-41 ft. Initially, only part of this section was opened at 10,836-41 ft. During 12 hours of a 22.5 hour drill-stem test of perforations, the well flowed 50 bbl. of oil from this zone through ⅛-in. choke. At the end of test, however, the well died and an additional section was opened at 11,821-36 ft. 2-in. tubing was then run on packer set at 10,800 ft. and well was swabbed and kicked off flowing at the rate of 175 bbl. of oil per day through 3/16-in. choke with tubing pressure 475 psi. Flow was cut with 3 per cent basic sediment and water.

MISSISSIPPI SUCCESSFUL WILDCAT

Franklin County: B. Serio-R. J. Bartlett 1 Hattie Bauer, Sec. 30-5n-1e, TD 6,610 ft., 175 bbl. of oil per day plus 20 per cent B. s. and w., 37.5°-gravity oil, perf. 6,356-62 ft.

MISSISSIPPI WILDCAT FAILURES

Adams County: John S. Callon 1 Lucie E. Barksdale, Sec. 2-4n-3w, dry, TD 6,805 ft.

B. Serio B-1 Board of Supervisors, Sec. 29-5n-3w, dry, TD 6,909 ft.

Jefferson County: J. Paul Ratliff, Jr. 1 Anderson-Tenner, Sec. 76-9n-1w, TD 6,496 ft.

J. Paul Ratliff 1 A. P. Millsaps, Sec. 30-9n-2e, dry, TD 6,510 ft.

Smith County: Ted Weiner 1 J. B. King, Sec. 36-10n-16w, dry, TD 9,558 ft.

ALABAMA WILDCAT FAILURE

Escambia County: Sunnyland Contracting Co. 1 A. D. Kelly Estate, Sec. 8-3n-9e, TD 5,950 ft., dry.

FLORIDA WILDCAT FAILURE

Jackson County: I. P. and Fred LaRue 1 Spencer, Sec. 30-4n-8w, TD 4,113 ft., dry.

Louisiana-Ark.

Smackover Discovery Is Possible At Monroe Field

SHREVEPORT.—American Republic Corp. is preparing to perforate for production at a possible Smackover oil discovery in Monroe field, Union Parish, at 1 Olin-Interstate-ARC fee, Section 20-21n-3e. The hole is bottomed at 9,396 ft. Well is known to have about 7 ft. of broken porosity in the upper part of the Smackover between 9,072-92 ft. On drill-stem test of the interval 9,072-92 ft. recovery was an estimated 770 ft. of 36°-gravity oil, 500 ft. of gas-cut mud and 3,000 ft. of water cushion with no formation water.

A. J. Hodges Industries, Inc. is setting 7-in. casing at about 11,200 ft. and will then core ahead at 1 Pardee Calloway et al, Section 35-21n-11w, deep test on the southwest flank of Cotton Valley field, Webster Parish. Hole is bottomed at 11,211 ft., probably in the top of the Gray sand of the Smackover formation. Well is exerting great pressure and showing some oil from that formation. Nearest production from the Gray sand is 4½ miles east and 1 mile north of the current test.

Arkansas.—Kirby Petroleum Co. is testing indicated Nacatoch pay in the Calion field area, Union County. The 1-B Southern Co., NW SW SW 18-16s-14w, flowed dry gas from perforations at 2,078-82 ft. and operator squeezed off and perforated the base of the Nacatoch sand for an attempt at oil completion.

Kirby has completed a new pay opener in new Calion field at 2-B Southern, Section 18-16s-14w. Operator is pumping 17 bbl. of oil per day from the Graves sand at 2,491-93 ft.

LOUISIANA WILDCAT FAILURES

Catahoula Parish: Texas Crude Oil Co. 1 Talioferro, C S½ NW NE 2-8n-6e, dry, TD 8,717 ft.

Natchitoches Parish: Kirby Petroleum Co. 1 Bentley Lumber Co., C NE NW 28-6n-4w, dry, TD 6,235 ft.

Union Parish: Carter Oil Co. 1 Adams, C SE SE 25-20n-1e, dry, TD 9,612 ft.

ARKANSAS SUCCESSFUL WILDCAT

Miller County: W. G. Skelly 1 Dickson, Sec. 36-19s-27w, flowed 132 bbl. of oil from

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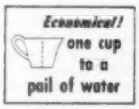

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Pettit 6,822-34 ft., TD 11,078 ft. (opens Doddridge pool).

ARKANSAS WILDCAT FAILURES

Clark County: Wm. C. Sturgis et al 1 McMillan, NWc NE NE 7-8s-21w, dry, TD 599 ft.

Lafayette County: Donald D. Montgomery et al 1 Moore "A," C NE SW SW 2-16s-25w, dry, TD 4,311 ft.

Southwest Texas

Operators To Perforate At Nueces Prospect

CORPUS CHRISTI.—Republic Natural Gas Co. is preparing to perforate above 4,445 ft. at 1 Chapman Ranch 81, wildcat 18 miles southwest of Corpus Christi in Nueces County, after testing oil and water lower down the hole. Total depth is 6,425 ft. and 5½-in. production string is cemented at 4,520 ft. From perforations 4,447-55½ ft., crews swabbed approximately 250 bbl. of fluid, 10 per cent oil, over an undisclosed period of time. Perforations were squeezed, and new perforations effected from 4,447-49 ft. Well was swabbed, making 10 bbl. of fluid per hour, 14 per cent oil. These perforations also have been squeezed. Wildcat is 5,730 ft. northeast of Republic Natural 1 Chapman Ranch 111, oil discovery, and is located on Section 81, Laureles Farm Tracts.

W. Earl Rowe has apparently opened a new Wilcox field at his 1 Baker estate, wildcat 3 miles northeast of Brazil in McMullen County. Well has produced condensate on three drill-stem tests (intervals 7,393-401, 7,406-11, and 7,411-18 ft.) and oil and salt water on a couple more (from 7,418-24 ft., recovery was oil; from 7,424-28 ft., oil and salt water). Operator was drilling ahead below 7,587 ft. on contract depth of 9,000 ft. Wildcat is on the M. F. Lowe Survey 16, A-883.

Locations for a couple more exploratory ventures in the Murdock Pass field area of Kenedy County have been staked by Sun Oil Co., discoverer of the reservoir. Firm's C-1 Laguna Madre State Tract 242 is in Laguna Madre. Second test is 1 Laguna Madre State Tract 243. Both tests are projected to 7,500 ft.

New pay horizon in San Ramon field of Hidalgo County has apparently been opened by Magnolia Petroleum Co. at 1 Lionides Longoria, 1,600 ft. east-southeast of the field discovery. Magnolia's test is bottomed at 8,700 ft., and perforations are effected from 8,536-62 ft. with 156 shots. Drill-stem test was run on perforations with ¼-in. top and ⅜-in. bottom chokes. Operator used 3,000 ft. of water cushion, and the well flowed water cushion in 3 minutes. Tool was open 5 minutes with top working pressure reaching 3,500 psi. Well was shut in for 7 minutes, with recovery of 120 ft. of condensate. Flowing bottom-hole pressures were 7,050-250 psi., shut-in pressure 7,540 psi. Venture is on the San Ramon Grant.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Kenedy County: Sun Oil Co. 2 Dunn-McCampbell, J. F. Boyles Sur., TD 9,002 ft., PT 24,000,000 cu. ft. of gas per day open flow, 49.7°-gravity oil, 248,000-1 gas-oil ratio.

Nueces County: Humble Oil & Refining Co. 1 Nina G. Stewart, Marion Lopez de Herrera Grant, TD 7,995, PT 2,650,000

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cu. ft. of gas per day open flow plus 14.7 bbl. 53-4°-gravity oil, gas-oil ratio 68,000-1.

San Patricio County: Humble Oil & Refining Co. 1 T. A. McKamey, San Patricio Co. School Land Sur. 4, TD 10,500 ft., PT 10,250,000 cu. ft. of gas per day open flow, perf. 9,945-65 ft.

Starr County: Taylor Oil & Gas Co. 4 Manuel Yzaguerre Est., TD 9,008 ft., PT 85.13 bbl. of oil per day on 9/64-in. choke, gas-oil ratio 4,000-1, perf. 8,042-48 ft.

6

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bandera County: Patrich H. and Douglas V. Downing 1 Nichols, Henry Jeffers Sur., TD 1,618 ft., dry.

Bastrop County: J. V. Calvert 1 Dave Smith, Jas. B. Biblock Sur., TD 1,601 ft., dry.

Duval County: Hawn Bros. 1 J. S. Brodovsky State, H. G. Foster Sur. 342, TD 1,904 ft., dry.

Pontiac Refining Co. 1 John D. Dinn, T&NO 142, A-2,075, TD 3,510 ft., dry.

Regal Drilling Co. 1 Clara Driscoll Est., GM&D 54, A-271, TD 3,436 ft., dry.

Frio County: J. C. McCabe 1 J. Otis Jones, Hooper & Wade 1 Sur., A-393, TD 3,533 ft., dry.

Robert K. Taylor 1 R. V. Lowe, BS&F, A-144, TD 924 ft., dry.

Texita Oil Co. & Trimark Oil Co. 1 S. B. Davies, B. L. Crouch Sur., A-1,271, TD 5,408 ft., dry.

Guadalupe County: Maple C. Hughes 1 Roy Zipp, A. M. Esnaurizar Sur., TD 1,540 ft., dry.

Milam County: A. L. Duff, Jr. 1 Carrie McLerran, Jos P. Jones Sur., TD 4,003 ft., dry.

Nueces County: Lonnie Glasscock 1 A. L. Hailey, Geo. H. Paul Subd., Tr. 3, Driscoll Ranch, TD 5,705 ft., dry.

Webb County: W. F. Calohan & R. F. Campbell 1 A. M. Bruni Est., El Ranchita Pasture, Jose V. Borrego Grant, TD 1,834 ft., dry.

Jack Daigle & John M. Young Parks-1 La Mesa Land & Cattle Co., Porcion 21, TD 1,207 ft., dry.

Frank Frankel 1 Manuel B. Volpe, Thos. R. Davis Sur. 2011, Blk. 14, TD 6,510 ft., dry.

Killam & Hurd 2 W. R. Nicholson, B&C & GN Sur. 1,257, Cert. A-909, TD 2,010 ft., dry.

Glen G. Mortimer, Jr. 3 R. E. Welhausen, CCSD&RGNG 18, TD 2,690 ft., dry.

South Louisiana

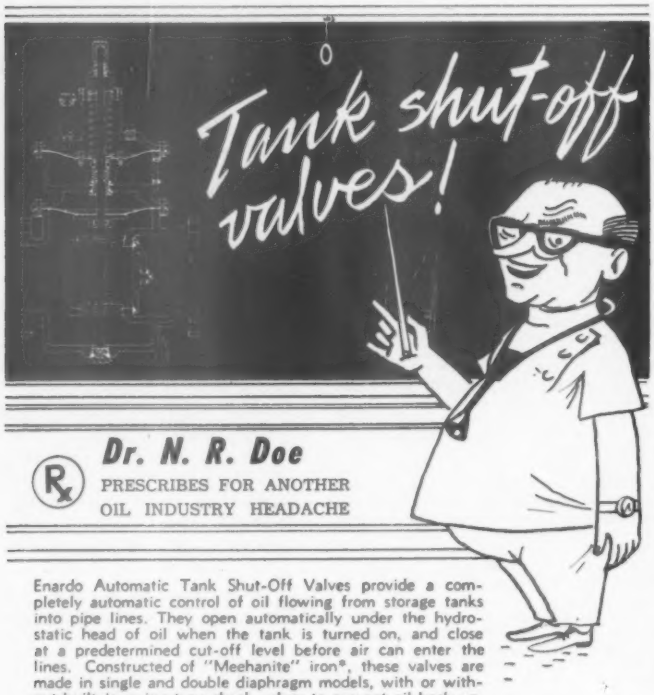
Potential Test Due At Assumption Prospect

NEW ORLEANS.—Texas Gulf Producing Co. is preparing to run potential test at the 1 Estate of Militus Babin, a semi-wildcat on the northwest flank of the Napoleonville dome in Assumption Parish, after effecting flow of pipe line oil on drill-stem test from perforations 10,308-318 ft. Test, located in the northwest quarter of Section 40-12s-13e, is bottomed at 10,995 ft., set pipe to 10,344 ft. and perforated 10,308-318 ft. Flow was rated at 192 bbl. of 36.5°-gravity oil per day on 8/64-in. chokes, tubing pressure at 2,150 psi., showing gas-oil ratio of 1,187-1. Drill-stem tool has been pulled, tubing run and operator is allowing the test to clean before starting potential.

Deep South Drilling Co. and Phillips Bros. of Baton Rouge, La. staked location for a north outpost to the 2-well Lobdell field in West Baton Rouge Parish. Firm's initial test in the new producing area of South Louisiana is 1 J. J. Gremellion, located on the northwest corner of Section 40-7s-11e, ½ mile north of the Circle Drilling Co. and C. B. Pennington 1 Catherine Sugars, discovery well, which flows oil from 9,313-330 ft. Humble confirmed the field at the 1 M. J. Kahao; however, failed to find the oil reservoir and completed in a new pay for the field in the 8,800 ft. pay. New test has projected depth of 10,000 ft.

With total depth near 10,600 ft., Texas Crude Oil Co. is trying to recover production packer from the 3 Wylie, wildcat on the Southeast Gibson Prospect of Terrebonne Parish, after which testing will be resumed near 10,560 ft. Operation, located in Section 84-17s-16e, is said to have logged sand at 9,638 ft., recovering 6 ft. of oil sand near 9,945 ft., 22 ft. of gas and condensate pay near 10,100 ft., another 28 ft. of possible pay at 10,550 ft., and top 8 ft. being gas sand. The sand at 9,638 ft. mentioned above is said to have shown about 12 ft. net oil pay. The actual yield of these intervals will be known when tested through perforations. The 3 Wylie is a third well for Texas crude on the prospect, the first 2 resulting in dry holes; however, had shows to necessitate a third well when all geological information had been assembled.

Ted Weiner, independent operator of Fort Worth, has begun testing operations at 3 Wylie, Section 84-17s-17e, in the Lake Hatch area of Terrebonne Parish, Louisiana. Initial perforations were made at the 10,568 ft. level. While going in hole with packer for initial test of perforations, packer became stuck. Operator is now attempting to free



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packer and continue with testing. Multiple sands were logged in the well and verified by side wall samples. A 14-ft. oil sand was topped at 9,638 ft. and a 6-ft. oil sand at 9,945 ft. A 22-ft. gas-condensate sand was topped at 10,100 ft. and a 28-ft. oil and gas sand at 10,551 ft. The top of the latter sand was described as gas with the remainder oil.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

St. Martin Parish: The Texas Co. 1 Schwing Lumber and Shingle Co., Inc., 85-7s-8e, TD 11,100 ft., Pt. 102 bbl. of oil in 24 hours on 25/64-in. choke and 4,700,000 cu. ft. of gas per day, 56°-gravity oil, gas-oil ratio 46,000-1.

SOUTH LOUISIANA WILDCAT FAILURE

Calcasieu Parish: Shell Oil Co. 1 W. R. Baker, Sec. 20-7s-10w, TD 7,004 ft., dry.

Texas Gulf Coast

New Yegua Production Found In Jasper County

HOUSTON.—Ada Oil Co. and Hurt Oil Co., Ltd., have found new Yegua oil production in Jasper County, 5 miles northwest of the town of Buna. Operator's 1 Hardy Richardson drilled to 8,155 ft. and after cementing production string perforated opposite the Yegua for production from 7,198 to 7,212 ft. When placed on a ⅛-in. choke the well produced 183 bbl. of 37.8°-gravity oil per day, having a gas-oil ratio of 535-1. The new oil strike lies in the J. D. Johnson Survey, A-21, about 1½ miles north-northwest of Buna field and 1½ miles west of the new West Castillo field. Buna field bears gas and condensate from the Yegua at the 7,424-28 ft. level and 45°-gravity oil from the Yegua at 7,459-69 ft. and 7,477-82 ft., while the 1 well West Castillo field produces oil from the Yegua from the 7,620-22 ft. zone.

After several attempts to find production in Galveston County, Hassie Hunt Trust has found oil pay in the Frio at the 1 Mrs. A. David, 1 mile south of the town of Alta Loma and about 2½ miles northeast of Alta Loma field. Drilled to 9,472 ft., the new discovery is perforated with 32 shots from 9,296-304 ft. and flowed 171.12 bbl. of 36.6°-gravity oil daily. Flow was effected through an 8/64-in. choke under a tubing pressure of 1,650 psi. Well recorded a casing pressure of 1,800 psi. and a gas-oil ratio of 1,107-1. Well spots in the Lemuel Crawford Survey, A-48, about ¾ mile west of the 1 Mike David which was extensively tested and flowed gas from the 9,947-71 ft. zone before dying.

K. & H. Operating Co. has potentialed its East Aldine oil discovery, the 1 J. H. Simmons for 54 bbl. of 40.5°-gravity oil daily while on a 3/16-in. choke. The 7,515 ft. well is producing from the Yegua at 7,019-21 ft. under a tubing pressure of 1,050 psi. with a resulting gas-oil ratio of 10,900-1. Well was formerly operated by Raymond D. Reynolds and lies 2 miles East of Aldin field in the Malcolm McCauley Survey, A-577.

The South Splendora gas-condensate production of Montgomery County is being confirmed by Austral Oil Exploration Co., Inc. at its 1 H. L. Patton, bottomed at 6,375 ft. Operator ran 6,318-25 ft. Operator opened the area in June of last year with the 1 R. H. Moffatt et al, producing 18,950,000 cu. ft. of gas daily on open flow from the Yegua at 6,318-26 ft. In addition to the gas flow, well made 35 bbl. of 60°-gravity condensate per million cu. ft. of gas and recorded a shut-in pressure of 2,301 psi.

The Pecan area of Fayette County is site for a new 10,000 ft. wildcat to be drilled by Fidelity Oil & Royalty Co. at the 1 Roy Wagenhoff et al. Falling on the S. A. Pugh Lge., A-85, location is approximately 2,100 ft. due west of the west line of the Jesse Burnham Lge. 7 miles northeast of Schulenberg townsite.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCAT

Jefferson County: John W. Mecom 1 Nona Mills Co., C. Hillibrand Sur., A-28, TD 8,845 ft., PT 23,000,000 cu. ft. of gas per day open flow, 47.7°-gravity oil, gas-oil ratio 131,000-1.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Henderson Coquat et al 1 D. N. Hamilton, Chittum & Miller Ranch, J. M. Uranga Grant, TD 9,024 ft., dry.

Spartan Drilling Co. 1 Tipps Ranch, Chas. Clark, A-135, TD 8,359 ft., dry.

Union Oil Co. of California & O. H. B. Co., Ltd. 1 John J. O'Brien, Wm. Ryan Sur., A-274, TD 3,307 ft., dry.

Brazoria County: Carnes W. Weaver 1 A. T. Morris, Johnson, Borden & Walker Sur., A-77, TD 10,303 ft., dry.

Calhoun County: The Texas Co. 1 P. Bindewald, Jose Felis de la Guentes, TD 8,565 ft., dry.

DeWitt County: Dudley T. Dougherty 1 Bluntzer heirs, John McCrabb, A-336, TD 7,980 ft., dry.

Galveston County: Brewster & Bartle 1 Geo.

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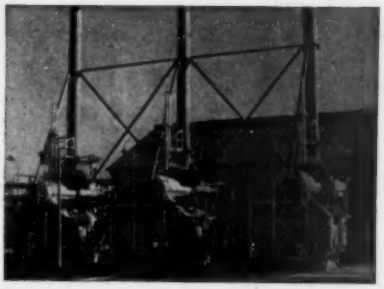

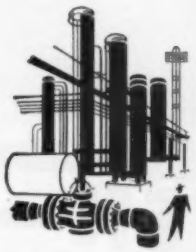

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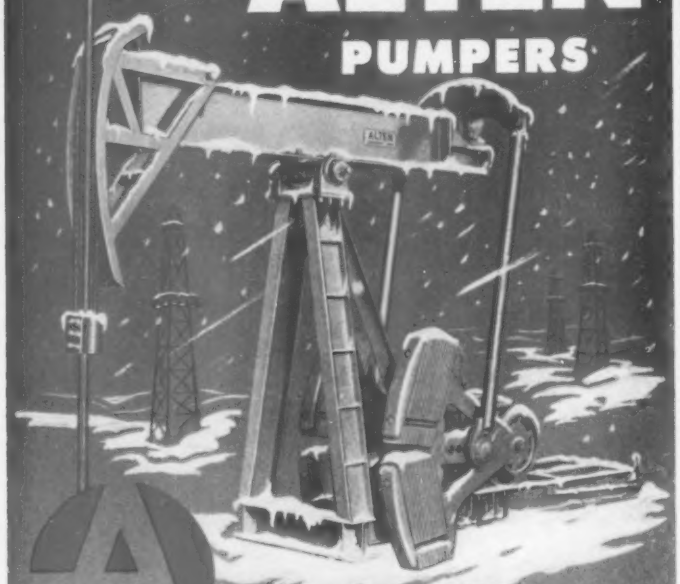

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B. Delany, W. K. Wilson Lge., A-208, TD 8,807 ft., dry.

Goliad County: W. C. McBride, Inc. 2 Nancy Jane Busby, Graviel Casias Sur., A-95, TD 4,993 ft., dry.

R. G. Piper 1 C. C. Ramsey, Maria Jesusa de Leon Sur., A-22, TD 5,208 ft., dry.

Harris County: Falcon Seaboard Drilling Co. 1 F. Wuensche, A. Scales Sur., A-687, TD 6,500 ft., dry.

Jasper County: Carnes W. Weaver 1 R. J. Cooper, A. Wright Sur., A-532, TD 7,820 ft., dry.

Karnes County: Dudley T. Dougherty 1 M. Speary, V. Zepeda Grant, A-13, TD 6,680 ft., dry.

Schimmel-Palmer et al 1 L. J. Trial, Erasmo Seguin Sur., A-10, TD 4,119 ft., dry.

Liberty County: Natural Gas & Oil Corp. 1 Grogan Land & Lumber Co., Daniel Donaho Sur., A-24, dry.

Live Oak County, Russell, Trull, & Thompson 1 Alvin W. Steinmeyer, Refugio Co. School Land, A-399, TD 4,673 ft., dry.

Newton County: Harrell & Southworth 1 Earl Hankamer, SPRR Sur., A-414, TD 7,103 ft., dry.

Orange County: Magnolia Petroleum Co. 1-H Lutcher & Moore, Benjamin Joynson Sur., A-119, TD 9,300 ft., dry.

Wharton County: Mikton Oil Co. 1 Wallace & Willis, M&C Sur. 5, A-278, TD 7,658 ft., dry.

Eastern Texas

Sand Flat Has Good Paluxy Strike in Prospect

DALLAS.—Sun Oil Co. had a good Paluxy oil prospect on the southwest flank of Sand Flat field in Smith County at 1 Hitts Lake, John Lane Survey. Drill-stem test 7,171-7,248 ft. had oil at the surface in 59 minutes and flowed an estimated 100 bbl. hourly with no water. Recovery was a pipe full of 24°-gravity oil. The field produces from both the Paluxy and the Rodessa.

New work planned for East Texas included a rank wildcat 5 miles south of Mosheim in Bosque County, to be drilled as O. C. Proffitt 1 J. W. Henry. Contract depth was 6,500 ft. and location is in the Aaron B. King Survey.

Rancho Oil Co. 1 T. Z. Shadix was located 10 miles southeast of Centerville in the N. G. Allen Survey, Leon County for a proposed 7,700-ft. test.

Fulton Bolton 1 H. L. Akin will attempt to extend Woodbine production in New Stone field of Cherokee County into Rusk County. Location is in the B. W. Heath Survey and projected depth was 4,000 ft.

Northeast Houston County was in line for a Woodbine sand exploratory test to be drilled by Ben W. Hearne and others as the 1 Smith heirs. Location is southwest of Palestine and about 1 mile east of A. D. Adams 1 Holcomb which found some oil in the Woodbine at 5,742-46 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Sabine County: Humble Oil & Refining Co. 1 Minta Polley Harvey, John Harton and Peter Ragsdale Sur., 5 miles SE Patroon, dry, TD 7,071 ft.

Shelby County: Natural Gas & Oil Co. 1 J. R. Bell, Ephran Story Sur., A-630, 5 miles NW Timpson, dry, TD 7,308 ft.

North-Central Texas

Prolific New Pay Added To White Flat Field

WICHITA FALLS.—A prolific third pay zone, and ¾-mile northwest extension to production was added to White Flat field of northeastern Nolan County at Payne-Johnston and B. G. Byars 1 Kegans, 25-20-T&P.

New pay section is in the Pennsylvanian Bend conglomerate at 5,499-5,535 ft., which tested 161.6 bbl. of 48°-gravity oil in 6 hours through 20/64-in. tubing choke, giving it a potential of 646 bbl. from that section.

The well also flowed 180 bbl. of oil in 6 hours through 20/64-in. choke on perforations in the Caddo and operators planned a dual completion. Other production in the field is from the Ellenburger.

Taylor County had a new discovery in the Home Creek pay at Roark, Hooker and V. C. Perini Jr. 1 Leslie N. Brown, 1 mile west of Tye. Production test through 16/64-in. choke on perforations at 3,260-70 ft. gaged 120 bbl. of 32°-gravity oil a day.

In Montague County Bay Petroleum Corp. 1 A. B. Ford was showing for conglomerate discovery production 4 miles south of Bowie. Drill-stem test at 5,964-72 ft. recovered 272 ft. of oil in 2 hours and 15 minutes. Operators were drilling ahead.

Robert Mims completed 1 H. C. Chambless, 41-19-T&P, as a Strawn discovery 1 mile southeast of Trent. Potential was 114.6 bbl. of oil a day through ¾-in. choke on perforations at 4,974-80 ft.

Bay Petroleum Corp. 1 Ford, Caddo conglomerate prospect 4 miles south of Bowie was running a second test to 6,000 ft., following recovery of 252 ft. of free oil with no water on a 2-hour test at 5,964-72 ft.

Elm Oil Co. 1 Pollard, extension test in the J. H. Stephens Survey, A-1,193, was drilling shale at 5,440 ft.

Russel Maguire 1 S. D. Howard, wildcat in the N. Kimbrough Survey, A-406, was drilling lime at 6,179 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Ace Drilling Co. 2 Bertha Mingle, Lot 40, Blk. 4, Clark & Plumb, TD 874 ft., elev. 1,007 ft., pay 872 ft., IP pumped 30 bbl. 36°-gravity oil.

Cook County: River Land & Development Co. 2 W. P. Luse, T. B. Hardwick Sur., A-1,599, TD 2,862 ft., elev. 952 ft., pay 2,846 ft., IP pumped 41 bbl. 40°-gravity oil.

Eastland County: G. A. Bloomquist 1 E. C. McClelland, Sec. 466, SPRR, TD 3,725 ft., elev. 1,546 ft., pay 3,761 ft., IP 10.3 bbl. 41°-gravity oil, 12/64-in. choke, TP 160 psi.

Jack County: Warren Petroleum Corp. 1 Cap Yates, George Ramsdale Sur., A-1,240, TD 5,948 ft., pay 5,710 ft., IP 151 bbl. 45°-gravity oil, 1-in. choke, GOR 1,467 cu. ft.

Jones County: Inca Drilling Co. 1 C. A. Johnson, 19-3-H&TC, TD 3,473 ft., elev. 1,514 ft., pay 2,132 ft., IP pumped 70 bbl. 39°-gravity oil, GOR 300 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: D. H. Bolin B-32 Thomas, Blk. 14, Nathan Thomas Sur., dry, TD 3,814 ft.

Callahan County: West Central Drilling Co. 1 E. E. Cook, Sec. 74, BBB&C Sur., dry, TD 4,816 ft.

Coleman County: Tiger Minerals, Inc. 1 L. S. West, Sec. 678, R. Young Sur., dry, TD 3,050 ft.

Wadsworth, Chapman and Peters 1 C. H. Edington, Sec. 187, Victoria CSL, dry, TD 3,687 ft.

Cooke County: A. R. McElreath 1 J. C. Blankenship, S. Willis Sur., A-1,102, dry, TD 5,032 ft.

Erath County: Trans-Western Oil & Gas Co. 1-A Russell, HT&B Sur., 29, A-396, dry, TD 4,202 ft., elev. 1,220 ft., Caddo 3,250 ft., Ellenburger 4,125 ft.

Grayson County: J. R. and Adam Seitz 1 J. A. Mullins, W. G. Miller Sur., A-790, dry, TD 4,136 ft.

Jones County: John E. Taylor 1 M. Ward, Sec. 48, OAL Sur., dry, TD 2,631 ft.

Texas Ice & Refining Co. 1 Mrs. Bettie Burleson, 208-10-J. W. McMissick Sur., dry, TD 3,505 ft.

Texas Ice & Refining Co. 1 E. E. West, Sec. 204, J. W. McKissick Sur., dry, TD 4,595 ft.

Knox County: Samedan Oil Corp. 1 G. H. Beavers, 8-3-D&WRR, dry, TD 6,504 ft.

Montague County: Armour Properties 1 Dollie P. Dean, P. Miller Sur., dry, TD 5,720 ft.

Palo Pinto County: A. F. Knappenberger 1 W. A. Gregg, James Finley Sur., A-180, dry, TD 3,200 ft.

Shackelford County: Sorrells Oil Co. 1 F. A. Ellis, Sec. 47, Bayland OAL Sur., dry, TD 1,203 ft.

Stonewall County: Continental Oil Co. 2 Brown Smith, 414-D-H&TC, dry, TD 4,002 ft.

Taylor County: DeSoto Oil Co. 1 T. W. Hedrick, J. H. Deavers Sur., dry, TD 5,019 ft.

Throckmorton County: Miami Operating Co. 1 J. W. Clark, Sec. 57, John Walker Sur., dry, TD 4,633 ft.

Grisham-Hunter Corp. 1 L. B. Wyly, Sec. 2,235, TE&L Sur., dry, TD 4,680 ft.

Tom B. Medders 1 Martha Shelton, W. S. Riddle Sur., A-1,236, dry, TD 4,782 ft.

Wise County: Trans-Tex Drilling Co. 1 F. Clayton, Blk. 9, J. Gholson Sur., dry, TD 5,200 ft.

Young County: Darden, Moore & Schultz 2 J. W. Sparks, Blk. 232, TE&L Sur., dry, TD 1,045 ft., Gunsight 1,025-29 ft.

Pat Fowler 1 B. W. King, TE&L Sur. 455, dry, TD 4,829 ft., Caddo 3,834 ft.

Permian Basin

Ector Ellenburger Test Nears Completion Stage

MIDLAND.—Texas Gulf Producing Co. 1 Headlee, Ector County wildcat, was nearing completion stage following a drill-stem test at 13,256-313 ft., total depth. The Ellenburger prospect, which went into the Ellenburger at 13,076 ft. on elevation of 2,914 ft., had a possible 237 ft. of pay section.

On the last test, open 4 hours, gas surfaced in 55 minutes and recovery was 1,530 ft. of water blanket cut with oil, and 7,000 ft. of clean oil. All drill-stem tests had recovered oil, and the section between 13,106-270 ft. flowed some oil.

Texas Gulf 2 Headlee was scheduled to start drilling immediately as a north offset to the discovery.

Magnolia Petroleum Co. completed an-

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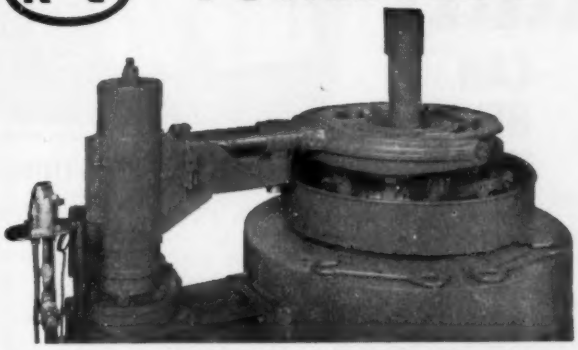

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other pre-Permian discovery in Andrews County at its 1-CA David Fasken, 4 miles southeast of Magutex Ellenburger field. The new well flowed 200 bbl. of high-gravity oil a day through 6/64-in. choke on perforations in the Devonian at 12,738-49 ft.

Shell Oil Co. 2-1 S. B. Burnett Estate, King County wildcat 8½ miles southeast of Guthrie, flowed oil on a drill-stem test in Strawn limestone. Tester on section at 5,520-45 ft. was open 2 hours and 20 minutes. Gas showed in 6 minutes and oil in 45 minutes, making an estimated 15 bbl. of 36°-gravity oil an hour. Operators were to drill ahead. Location is in the south-central portion of Shell's big 206,000-acre Burnett Ranch lease.

In Terry County, Cities Production Co. 1-D Starnes, squeezed perforations in the Fusselman at 11,757-82 ft. and prepared to test higher in the section. A previous drill-stem test in top of the Fusselman at 11,607-30 ft. flowed 70 bbl. of oil in 3 hours.

Progress reports on deep tests included the following: Ralph Lowe 1 Bain Price, Yoakum County wildcat, prepared to abandon dry at 12,030 ft. after plugging back to 5,335 ft. Gulf Oil Corp. 1 Northrup, Reeves County, was drilling shale and sand at 13,631 ft. Continental Oil Co. 1 Watson, projected 16,000-ft. Ward County test, had plugged back to 5,606 ft. from total depth of 14,878 ft. and was testing. Magnolia Petroleum Co. 1-BA Fasken, had total depth at 12,870 ft. and was waiting on cement. Humble Oil & Refining Co. 1-Q University, east of Andrews, was drilling at 12,098 ft.

In the Texas Panhandle, Gulf Oil Corp. 1 McCuistion, 2½-mile southeast extension to Quinduno field, flowed 141 bbl. of 49°-gravity oil a day through ¼-in. choke on perforations at 4,110-13 ft. Gulf 1-A McCuistion recovered 310 ft. of 45°-gravity oil and 180 ft. of mud and oil-cut salt water on a 2-hour drill-stem test in the Douglas sand from 6,225-60 ft. On the field's northwest side, Gulf 3 Haggard recovered mud and salt water on a test in top of the granite wash from 6,775-6,800 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Texas Eastern Production Co. 1-O David Fasken, 5-40-T1N-T&P, dry, TD 13,810 ft., elev. 2,996 ft., Mississippian 12,110 ft., Devonian 12,820 ft., Ellenburger 13,789 ft.

Concho County: O. C. Proffitt 1 Sansom Land & Cattle Co., Blk. 72, T&NO Sur. 328, dry, TD 1,407 ft.

Dawson County: Standard Oil Co. of Texas 4 M. V. A. Smith, 34-C41-PSL, dry, TD 11,376 ft., elev. 3,080 ft., Mississippian 10,665 ft., Ellenburger 11,240 ft.

Dickens County: Ashland Oil & Refining Co. 1-3 Pitchfork, 3-D-T. A. Thompson Sur., dry, TD 7,079 ft., elev. 2,205 ft., Canyon 5,600 ft., Caddo 6,750 ft., Mississippian 6,860 ft.

Gaines County: Sandor Petroleum Co. 1 Oil Development Co., 3-C34-PSL, dry, TD 5,760 ft., elev. 3,343 ft., San Andres 5,133 ft.

Pecos County: Hunt Oil Co. 46 Elsinore, 49-A-GC&SF, dry, TD 1,863 ft.

Reagan County: Atlantic Refining Co. 1 University B-11, 17-11-University, dry, TD 10,205 ft., elev. 2,641 ft., Devonian 9,255 ft., Silurian 9,500 ft., Ellenburger 9,780 ft.

Runnels County: Rowan Drilling Co. 1 F. Moeller, Asa Clark Sur., dry, TD 4,710 ft.

Schleicher County: A. W. Head and John L. Welch Jr. 1 Boyd, 15-H-GH&SA, dry, TD 5,312 ft., elev. 2,351 ft., Strawn 4,865 ft., Ellenburger 5,232 ft.

Sterling County: Pan American Oil Co. 1 R. T. Foster, 17-13-SPRR, dry, TD 8,711 ft., elev. 2,399 ft., Ellenburger 8,552 ft.

Sutton County: Sheardy A. Lamb 1 Mrs. W. Faulkner, Sec. 81, Blk. A, Sur. 81, dry, TD 3,205 ft., Strawn 2,840 ft.

Tom Green County: J. D. Hancock 1 J. W. Turner, Sec. 1,135, TCRR Sur., dry, TD 848 ft.

Alex J. Hickey and C. B. Drilling Co. 1 Washington CSL, League 105, Washington CSL, dry, TD 6,105 ft., elev. 1,920 ft., reef 5,170 ft., Ellenburger 5,928 ft.

Morris G. Spencer 1 Washington CSL, Washington CSL Sur. 106, dry, TD 6,510 ft., elev. 1,956 ft., Strawn 5,545 ft., Ellenburger 6,325 ft.

Texas Crude Co. 1-2 Blaylock, S. M. Condron Sur. 2, dry, TD 5,802 ft., Palo Pinto 5,330 ft., Strawn 5,682 ft.

Union Oil Co. of California 2 E. H. Jones, German Immigration Sur. 756, dry, TD 309 ft.

SOUTHEAST NEW MEXICO

Sun Oil Co. 1 Harper-Federal, Lea County wildcat, ran a 2-hour and 5-minute test from 12,930-50 ft., possibly in the Wolfcamp, and recovered 10 ft. of heavily oil and gas-cut mud, 45 ft. of clean oil and 180 ft. of slightly oil and gas-cut mud.

Core recovery from 12,951-76 ft. included 10 inches of hard black shale bleeding a slight amount of oil, with scattered pin-point porosity. It was to be reamed out and drilled ahead.

Richardson & Bass 1 Cobb-Federal, Eddy County, had total depth at 12,558 ft. in

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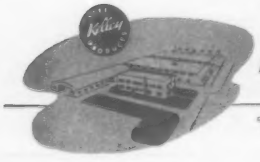

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sand. Drill-stem test from 12,482-558 ft. had gas in 24 minutes and water blanket in 1 hour and 20 minutes. Mechanical trouble cut the test short at 1 hour and 49 minutes. Gas volume was gaged at 730,000 to 1,000,000 cu. ft. daily.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Shell Oil Co. 1-CA State, 23-16s-36e, TD 12,751 ft., elev. 3,879 ft., Wolfcamp 9,820 ft., pay 10,148 ft., IP 504 bbl. 41°-gravity oil, 22/64-in. choke, TP 475 psi., GOR 748 cu. ft.

Oklahoma

Eola Extension Well Makes Good Producer

PRODUCTION of the Eola field in Garvin County has been extended ¾ mile to the north with a Bromide sand well flowing 378 bbl. in 17 hours through 20/64-in. choke. The extension producer is Vickers Petroleum Co. 1 Ferguson, located in the SE SW SW 6-1n-2w. Pay zone is open through casing perforations at 10,434-60 ft. and 10,490-10,509 ft. Following the 17-hour flow test, the well was shut in for additional storage and connections. Flowing pressure on the tubing was 1,050 psi.

Additional good saturation has been logged in second Wilcox sand at MacMillan Petroleum Corp. and associates' Logan County wildcat, 1 Krout, NE NW SW 14-15n-4w, southwest of Navina. At a total depth of 6,519 ft., the well had 54 ft. of net oil sand in 64 ft. of second Wilcox pay. A 60-minute drill-stem test at that depth, taking in the interval below 6,475 ft., got gas in 4 minutes and flowed oil at an estimated rate of more than 100 bbl. per hour. A previous test with bottom at 6,480 ft. flowed oil at the rate of 20 to 25 bbl. per hour. Hole is being cored ahead and may be carried to the Arbuckle. Location is northeast of the Northeast Lockridge gas-distillate area and a mile south of the West Navina field.

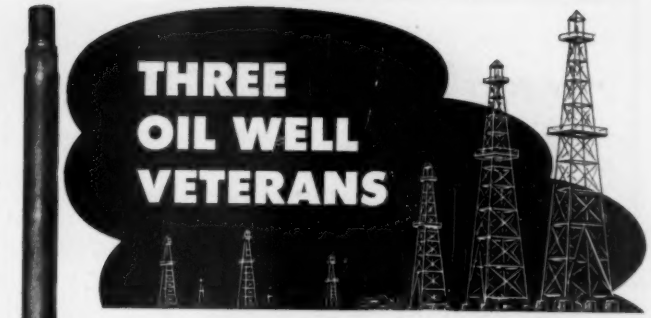
Morgan Drilling Co. 1 James, SW SE SW 25-13n-4e, extension well ½ mile north of production of the active East Payson field, southern Lincoln County, filled with oil and then swabbed at the rate of 10 bbl. of oil per hour following a nitro shot. In tests before shooting it swabbed at the rate of 4 bbl. per hour. Production is from open hole at 4,047-70 ft. in the field's lower Skinner sand pay.

Revival and extension of the abandoned producing area north of Kendrick, also in Lincoln County, are in prospect at W. A. Barton and associates 1 Hartwell, SW SW NW 5-15n-5e, where production tests of oil showings obtained in Prue sand are getting under way. A previous drill-stem test, open 11 minutes, in the pay at 3,524-55 ft. got gas in 4 minutes and recovered 30 ft. of oil and 270 ft. of oil-cut mud. Hole, drilled to 3,537 ft., has oil-string run to 3,525 ft.

Zora Faye Wingate has a new Senora-sand extension well at 2 Vance, SW SE NW 20-5n-6w, in southern Seminole County. The well, located ¾ mile southwest of nearest other Senora production, flowed 7 bbl. of oil per hour through ¼-in. choke in completion tests. Pay is in open hole at 1,645-1,660 ft. It is ½ mile east of the Whetley pool, where production is from Hunton lime.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Davon Oil & Gas 1 Norvell, NE NE NE 10-3n-2e, pumped 25 bbl. of oil from 2,760-89 ft., TD 2,980 ft.



Pump Parts Hard-Faced with Spraywelder Save Time, Money

1 This plunger pumped salt water for twenty-two months straight, 3½ times as long as did unprotected plungers, which lasted only three to four months.

2 Plunger from a pump in acid service. Worked 24 hours a day for over twelve months, more than 4 times as long as previous plunger (not hard-faced).

3 This 1½-inch diameter gasoline pump rod worked constantly for twenty-four months, 8 times as long as it did before being hard-faced. Packing maintenance almost entirely eliminated with Spraywold surface.

These three pump parts are proof that hard-facing with the Colmonoy Sprayweld Process will save you time and money. Each was in continuous service in Oklahoma's producing fields far longer than is usually considered normal, and the Spraywelding that produced these results was quickly and easily done.

These particular parts were done by the J. P. Machine and Tool Co., Oklahoma City. They were photographed before being Spraywelded with Colmonoy No. 6 again, to repeat their impressive record in the field.

In lasting from 4 to 8 times as long as new, unprotected parts, these reclaimed plungers and rod saved the cost of many new parts and also saved the time usually lost in frequent replacement of worn parts.

The Colmonoy No. 6 overlay, when applied by the Spraywelder, is smooth and dense. It has a low co-efficient of friction, which causes much less wear on the packing. Less pump down-time due to repacking is a real advantage.

Instead of buying new replacement parts, call the nearest Wall Colmonoy branch office and find out where you can have Spraywelding done. Then you can spend less time and money on maintenance, and get longer pump service.

There are two basic steps in the Sprayweld Process. First the powdered Colmonoy alloy is sprayed on with the Spraywelder. Then this overlay is fused with an oxy-acetylene torch to effect a welded bond. See photos. Overlay depth is easily controlled and finishing time is held to a minimum. Write for the Sprayweld Catalog.

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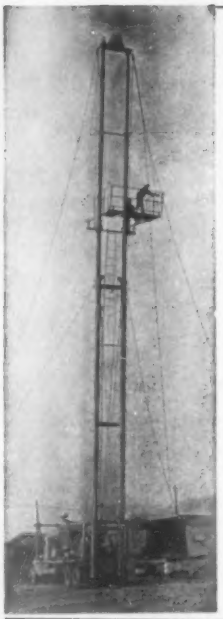

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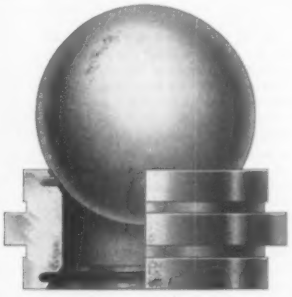

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TULSA, OKLAHOMA

Texas County: Cities Service Oil Co. 1 Shores "A," NW NW SE 36-3n-11eCM, flowed 10.7 M.c.f. of gas from 2,733 ft., TD 3,802 ft.

OKLAHOMA WILDCAT FAILURES

Cleveland County: V. A. Brill 1 Jones, SE SE SE 34-9n-1e, dry, TD 6,356 ft.

Cotton County: S. F. Hutchinson 2 Adams, SE SE SW 32-1s-11w, dry, TD 2,075 ft.

Garvin County: Erle P. Halliburton 1 Kerp, NW SE NE 18-2n-2e, dry, TD 3,560 ft. Erle P. Halliburton 1 Hensley, NW NW SE 25-3n-1e, dry, TD 4,601 ft.

Lincoln County: Davon Oil Corp. 1 Henitz, NW NW SE 32-13n-5e, dry, TD 4,405 ft.

Okfuskee County: Evans & Halbert 1 Replogle, NE NE SW 4-12n-8e, dry, TD 3,760 ft.

D&L Oil Co. and Arthur Olson, Jr., 1 Curry, SE SW SE 19-13n-8e, dry, TD 4,143 ft.

Texas County: Cities Service Oil Co. 1 Flanagan "A," SW SW NE 32-3n-11e-CM, dry, TD 3,695 ft.

California

Cuyama Valley Has Most Activity in Year

LOS ANGELES.—Cuyama Valley, with six wildcats under way and a seventh preparing to start, was enjoying the most activity it has seen in the past year. In South Cuyama field development of Hibberd zone production also again was under way after a lull of almost a year.

On the southeast end of the valley The Texas Co. 1 Signal-Maxwell in 19-9n-25w was drilling below 6,000 ft.; in 4-9n-24w, General Petroleum Corp. was starting 14-4 Clayton; and in 28-9n-6w Superior Oil Co. had location prepared for 2 Cuyama-Government.

In the vicinity of Russell Ranch, C. W. Colgrove had two tests under way, 22 Russell in 4A-10n-26w and 82 Russell in Section 16A. About ½ mile west of Clayton pool, North Basin Exploration Corp. 1 Whitney was drilling below 2,000 ft., and northwest of Superior pool Richfield Oil Corp. 75-3 Howard was at a similar depth.

At Wheeler Ridge in southeastern San Joaquin Valley, Richfield completed its fourth producer in the 9,500-ft. Eocene pool. As were the other three, 14-28 Gordon flowed at rates in excess of 1,000 bbl. daily. Approximately ½ mile east of Richfield's production, Standard Oil Co. of California was still attempting to complete 356 K.C.L.-2. Casing was set at 11,059 ft., about 1,500 ft. lower than in Richfield's wells. The latter's 1 San Emidio-B, a wildcat 2½ miles southwest of Wheeler Ridge, was drilling at about 7,000 ft.

General Petroleum has staked a ⅓-mile southeast extension attempt to the Crown Drilling Co. discovery in the Edison area. The new test was 27-9 Graham in SW SW 9-30s-29e. Another wildcat seeking the 5,800-ft. pay found by Crown 76-8 Jeppi-Camp was Stansbury-Webb 81 Porter in NE NE Section 17, drilling below 4,200 ft.

Among the new San Joaquin wildcats announced were two by Tide Water Associated Oil Co. in the Chowchilla area of Madera County. They were 1-7 Redman-Stone in 7-10s-14e and 1-20 Redman-Stone in Section 20. Another gas test announced was Humble Oil & Refining Co. 1 Capital Co., in 28-16n-1w. This test will be about 2 miles west

Typical of many, one master mechanic says, "We *always* use Hercules Red-Strand wire rope, because we know we can trust it for long life and safe service . . . every time." An inspector reports, "On a work test, we really abused Leschen rope. It *more* than satisfied our requirements."

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of its 1 Belle-Fletcher, recently abandoned at 7,601 ft.

A new Fresno County wildcat getting under way was a 8,000-ft. Eocene test by Steele Petroleum Co. The test, 1 Ormond, was being rigged about 3½ miles southeast of Camden production, in 27-17s-20e. Signal Oil & Gas Co. abandoned 85-20 Signal-Burrel in 20-16s-18e, 3 miles northwest of Burrel field, after drilling to 7,207 ft.

A new Los Angeles basin test was that of The Texas Co. on the 90,000-acre Irvine Ranch near Santa Ana. The wildcat, expected to drill to about 4,500 ft., will be 1 Irvine Ranch in 18-5s-8w. Location is north of a recently abandoned Shell Oil Co. wildcat.

Union Oil Co. halted drilling of its wildcat located about midway between Sansinena and Puente fields and plugged back for redrilling. The test, 1 Lindauer, in 32-2s-10w, was drilled to 7,334 ft. before being plugged back to 588 ft.

CALIFORNIA WILDCAT FAILURES

Colusa County: Colusa area: Humble Oil & Refining Co. 1 Belle-Fletcher, 26-16n-1w, dry, TD 7,601 ft., elev. 66 ft.

Kern County, Belgian Anticline area: Union Oil Co. 62X-24 Jewett Fee, 24-30s-21e, dry, TD 8,520 ft., elev. 1,530 ft.

Lost Hills area: Richfield Oil Corp. 1 Lost Hills Fee F, 12-26s-20e, dry, TD 3,214 ft., elev. 379 ft.

Salt Creek area: Richfield Oil Corp. 1 Hood-Wallace, 13-29s-20e, dry, TD 1,760 ft., elev. 1,098 ft.

Tejon Hills area: J. F. Kosanke 11 C.O.K., 14-11n-18w, dry, TD 717 ft., elev. 1,113 ft.

McKittrick Front area: Standard Oil Co. 52-7Z "Well," 7-30s-22e, dry, TD 6,765 ft., elev. 910 ft.

Orange County, Huntington Beach area: Christianson & Powley 1 Terry, 11-6s-11w, dry, TD 3,080 ft., elev. 56 ft.

San Luis Obispo County, Crocker Canyon area: Richfield Oil Corp. 1 Dodds Thomas, 10-31s-21e, dry, TD 4,959 ft., elev. 3,136 ft.

Solano County, Maine Prairie area: Amerada Petroleum Corp. 2 Peters, 4-5n-2e, dry, TD 7,205 ft., elev. 17 ft.

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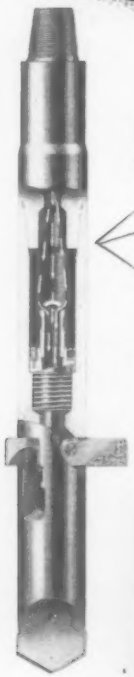

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Kansas

New Arbuckle Pool for Southwest Ellis County

LEWIS DRILLING CO.'s new discovery well, 1 Reidel, SW SE SW 8-14s-19w, a mile south of the Irivin pool, in southwestern Ellis County, swabbed 48 bbl. of oil in a 6-hour test after acidizing, and is being put on the pump for completion. Pay zone is Arbuckle lime in open hole at 3,839-47 ft. Top of the pay was logged at 3,837 ft. The discovery is separated from the Irvin pool by dry holes.

Transit Corp. and Davis Brothers 1 Berens, ¼ mile from the abandoned Kunz pool and a mile southeast of the Dreiling pool, also in Ellis County, flowed 25 bbl. of oil the first hour, and then made 10 bbl. of oil per hour by heads while testing good showings found in Arbuckle lime. Casing is perforated at 3,096-3,103 ft. and 3,072-78 ft., in Lansing. Previous tests in Arbuckle lime got water with a scum of oil. Hole is plugged back to 3,120 ft. Lansing top is given as 3,069 ft.

In northwestern Ellis County, Trans-Era Petroleum, Inc., is opening a new Arbuckle producing area 1¼ miles south of the Solomon pool where its 1 Merrill, SW SW NE 4-12s-19w, is being put on the pump following swabbing tests which recovered 5½ bbl. of net oil per hour. Water production was about 3 bbl. per hour. Total depth is 3,648 ft. with hole open below 3,646 ft. Top of the Arbuckle is 3,645 ft.

Ross & Shaefer have a new Simpson-sand producer ¾ mile south of production in the Iuka-Carmi field at their 1 Seidel, NE NE NW 19-27s-12w. The well flowed 75 bbl. of oil in the first 80 minutes with pay open through casing perforations at 4,302-16 ft. Simpson was logged at 4,284-4,323 ft. Total depth is 4,355 ft.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Victor Drilling Co. and Deep Rock Oil Corp. 1 Brungardt, SW NE SW 16-13s-20w, pumped 173 bbl. of oil from 3,862-70 ft., TD 3,870 ft.

Greenwood County: Susmiol 1 Jones, NE NE NE 2-24s-12e, pumped 7 bbl. of oil from Mississippian 1,752-85 ft., TD 1,815 ft.

KANSAS WILDCAT FAILURES

Barton County: Rocket Drilling Co. 1 Curry, SE SW SW 33-18s-13w, dry, TD 3,435 ft.

Butler County: Murfin Drilling Co. 1 Dickens, SW SE SE 36-25s-6e, dry, TD 2,758 ft.

E. F. Wakefield 1 Gilliland, SE SE NW 25-27s-5e, dry, TD 2,765 ft.

Ellis County: D. Pratt 1 Dinges, NW NW NE 35-13s-19w, dry, TD 3,931 ft.

Aurora Gasoline 1 Rohr, SE SE SE 18-14s-18w, dry, TD 3,792 ft.

Victor Drilling Co. and Deep Rock Oil Corp. 1 Orth, NE NE SW 4-14s-19w, dry, TD 3,920 ft.

Ellsworth County: Shelley-Miller 1 Nagle, NW NW NE 27-17s-10w, dry, TD 3,360 ft.

Harper County: Morrison Drilling Co. 1

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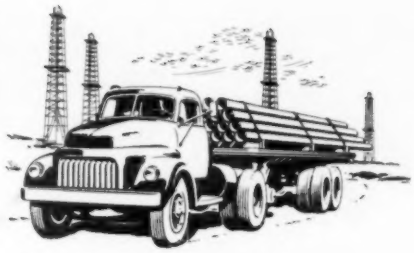

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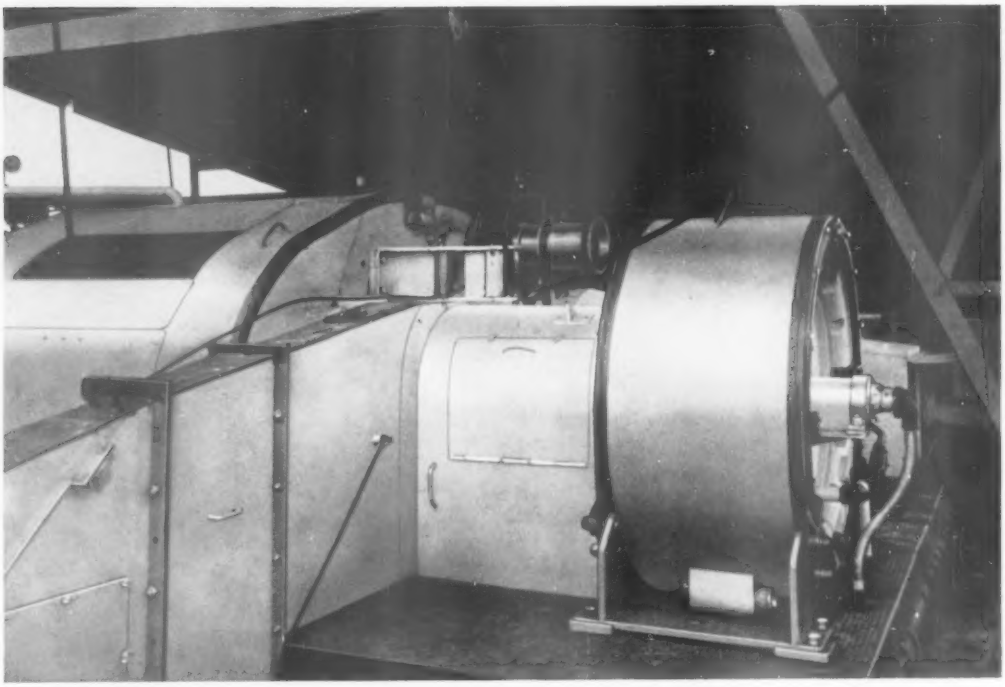

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Hinner, NE NE NE 31-32s-5w, dry, TD 4,846 ft.

Meade County: Skelly-Solar 1 Woodruff, SW SW NE 27-33s-26w, dry, TD 5,810 ft.

Reno County: Braden Drilling Co. 1 Russell, SE SE NW 30-23s-7w, dry, TD 4,120 ft.

Rice County: Morrison Drilling Co. 1 Howe, SW SW SE 32-21s-9w, dry, TD 3,667 ft.

Rooks County: Trans-Era 1 Hayes, SE SE SE-30-8s-18w, dry, TD 3,540 ft.

Rush County: Northern Ordnance 1 Stegman, NW SE NE 11-16s-17w, dry, TD 3,524 ft.

Trego County: Jones, Shelburne & Farmer 1 Waggoner, NE NE NW 25-14s-21w, dry, TD 3,935 ft.

Central Area

ILLINOIS

Production of the Herald pool, 6 miles northeast of Omaha, in White County, is being extended ¾ mile to the southwest. The extension well, Clarence 2 Bayley, SW SE NE 16-7s-9e, swabbed 36 bbl. of oil per day natural in preliminary tests of saturation found in Cypress sand at 2,606-26 ft. Total depth is 2,905 ft.

Several miles to the north, in the NW SE SE 5-7s-9e, E. J. Cunningham is putting his new discovery well, 1 Downen, on the pump following swabbing tests which recovered 6 bbl. of oil per hour. Production is from Benoist sand at 2,893-2,902 ft. Location is about 2 miles west of the north end of the Herald pool, and about the same distance east of the Roland pool.

Calvert Drilling, Inc., has a possible new discovery well in northwestern Richland County. The prospective well, 1 Jenner, SE SE SE 7-4n-9e, got 600 ft. of gas and 150 ft. of mud-cut oil in a 90-minute drill-stem test at 2,666-2,707 ft. in the top of Cypress sand. Another test with hole deepened to 2,720 ft., got 660 ft. of gas, 120 ft. of mud-cut oil, and 30 ft. of oil-cut mud. Casing has been run for completion. Location is about a mile east of the Passport field, northeastern Clay County.

INDIANA

Ralph Halbert and associates are completing an exceptionally good producer in the new development on the east side of the Griffin field in the area 4 miles southeast of Grayville. The well, 1 Glaze, NE SW SE 3-4s-14w, flowed at the rate of 480 bbl. of oil per day in initial production tests. Pay is Aux Vases sand at 2,825-55 ft. Their northeast offset, 2 Fisher-Welsh, SW NE SE 3, also appears to be a good well in the same pay, logged at 2,821-46 ft., and has casing run for completion.

WESTERN KENTUCKY

The Texas Co. has an indicated new oil discovery 7 miles southwest of Morganfield, in western Union County, where its 1 Gill, C NW NE 3-N-18, encountered promising showings in a Pennsylvanian sand at 1,394-1,415 ft. A 2-hour drill-stem test with bottom at 1,407 ft. got 75 ft. of gas, 35 ft. of oil, and 22 ft. of oil-cut mud. Another test, open the same time, with bottom at 1,415 ft., recovered 350 ft. of clean oil. No water was indicated in either test. Bottom-hole pressure gaged 500 psi. Location is 1½ miles south of production in the Spring Grove area. Location is at the extreme west end of oil development in western Kentucky.

EASTERN KENTUCKY

In the Knott County sector of Big Sandy gas field, Kentucky West Virginia Gas Co. has completed 5941 Lizzie King on Puncheon Branch for an open flow potential of 381,000 cu. ft. of gas daily. Producing formation is the Devonian black shale topped at 2,775 ft. and penertated to a total depth of 3,236 ft. Well was shot with 4,800 lb. of gelatin.

On Shelby Creek and in the Pike County sector of Big Sandy gas field Kentucky West Virginia Gas Co. has completed 6,049 Stephen Osborn for 133,000 cu. ft. of gas daily from Devonian black shale at a total depth of 3,641 ft. after shooting with 6,200 lb. of gelatin.

MICHIGAN

Panhandle Eastern Pipe Line Co. was preparing to perforate and test another well in St. Clair County in the basal Salina—a well which appeared to have the best-looking gas pay in horizon of any well drilled to date in the area. Company's 2 Adamski, SW NE SE 2-3n-15e, Ira Township, logged Niagaran top at about 2,349 ft. and was drilled to 2,375 ft., total depth, where 7-in. casing was being run in preparation for perforating, acidizing and testing. First drill-stem test of the pay sections was run from 2,270-2,325 ft. Well showed gas in 7 minutes. At the conclusion of the 1 hour test well gaged at 62,000 cu. ft. of gas a day. The second and more encouraging drill-stem test was run for 30 minutes at 2,322-75 ft. and well showed for 792,000 cu. ft. of gas when gaged. Bottom-hole pressure was 1,160 psi. The 2 Adamski is the approximate southwest offset to same company's 1 Adamski wildcat which showed for about 100,000 cu. ft. of gas a day natural from the same horizon, has been under test for several weeks following acid treatment and may or may not be completed as a gas well.

The Lazy Oil Co. and Montcalm Oil Co.

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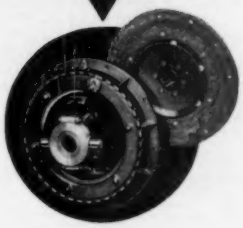

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ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

appeared to have extended the Richfield oil pay on the west flank of the West Branch field about ¾ mile south at the 1 Gray, NE NE SE 23-22n-1e, Ogemaw Township, Ogemaw County. Well showed for about 7 bbl. of oil, plus a small water-cut natural from pays at 4,110-13; 4,116-19; and 4,155-59 ft. Well was drilled to a total depth of 4,173 ft. Well will be acidized.

ILLINOIS SUCCESSFUL WILDCAT

Wayne County: Wayne Misener 1 Reed, SE SW NE 12-1n-8e, IPP 125 bbl. of oil from lower O'Hara 3,124-32 ft., TD 3,185 ft. (new pool).

ILLINOIS WILDCAT FAILURES

Clay County: Calvert Drilling Co. 1 Hostettler, NW NW NE 6-4n-8e, dry, TD 3,068 ft.

George & Wrather 1 Gill Comm., NE NE SE 27-3n-6e, dry, TD 3,145 ft.

Clinton County: Mohawk Drilling Co. 1 Schmitt, SW NE SE 1-3n-2w, dry, TD 1,291 ft.

Mohawk Drilling Co. 2 Lobmier, NW NW SE 1-3n-2w, dry, TD 1,289 ft.

Mohawk Drilling Co. 1 Elliott, SE SE NE 1-3n-2w, dry, TD 1,296 ft.

Crawford County: H. C. Henderson 1 Miller, NE SW NW 35-6n-11w, dry, TD 1,010 ft.

Jasper County: Murvin & Steber 1 Martin, NE NW NW 8-8n-14w, dry, TD 1,417 ft.

Jefferson County: Dale Hopkins 1 Price, SW SW NW 25-2s-2e, dry, TD 2,641 ft.

Lawrence County: Murvin & Steber 1 Piper, NW NW NE 35-4n-13w, dry, TD 2,195 ft.

Marion County: C. J. Simpson 1 Dexter Cone, NE SE NE 15-2n-2e, dry, TD 2,254 ft.

Morgan County: G. W. Fielder 1 Miner, NW NE NE 8-13n-8w, dry, TD 1,225 ft.

McDonough County: Glenn Salmons 1 Hoyt, NW SE SW 35-5n-4w, dry, TD 479 ft.

St. Clair County: L. V. Horton 1 Wagner, NW NE NW 1-3s-6w, dry, TD 2,786 ft.

White County: Illinois Mid Continent 1 Corvin-Jacobs, SW SW SW 21-4s-10e, dry, TD 3,250 ft.

INDIANA SUCCESSFUL WILDCATS

Dubois County: L. F. Burkhart 1 Hanebutt, NW NW SW 9-3ɛs-5w, 5 bbl. of oil from Paint Creek lime 840-44 ft., TD 844 ft. (new pay in Huntingburg pool).

Vanderburg County: Superior Oil Co. 1 Kolb, SE NW NW 28-6s-11w, 5 bbl. of oil from Jackson 2,167-83 ft., TD 2,632 ft.

INDIANA WILDCAT FAILURES

Gibson County: Joe Murphy 1 McCarty, SE NW SE 9-2s-9w, dry, TD 1,763 ft.

Calvert Drilling Co. 1 Leffler, SE NE SW 20-3s-9w, dry, TD 1,973 ft.

Knox County: West Drilling Co. 1 Government, NE NE NE 28-1n-11w, dry, TD 2,206 ft.

Martin County: M. W. Brewer 1 Kirby, CW½ NW NW 7-3n-3w, dry, TD 840 ft.

Pike County: R. D. Brown 1 McLaughlin, CS½ NE NE 26-1s-7w, dry, TD 2,942 ft.

Posey County: Oil Management, Inc. 1 Webb, NE NE SE 23-7s-13w, dry, TD 2,430 ft.

KENTUCKY SUCCESSFUL WILDCATS

Henderson County: A. W. Cherry 1 Fohs, NE SW SW SE 25-Q-22, IPP 125 bbl. of oil from Tar Springs 1,836-60 ft., TD 1,860 ft. (opens Geneva South pool).

Lohman & Johnson 4 Blue-Tract 2, SE SE SE NW 4-N-24, IPP 25 bbl. of oil from Cypress 2,184-89 ft., TD 2,193 ft. (new pay in Greenbriar South pool).

Muhlenberg County: K. R. Ingle 1 Raby, NE NW SW NW 25-I-29, IPP 40 bbl. of oil from Benois 1,656-70 ft., TD 1,675 ft. (new pay in Old pool).

Webster County: E. G. Burke 1 Jackson heirs, NW NE NE SW 25-M-23, IPP 58 bbl. of oil from Hardinsburg 2,685-2,710 ft., TD 2,719 ft. (new pay in Dixon pool).

KENTUCKY WILDCAT FAILURES

Henderson County: V. R. Gallagher 1 Alexander, SE SW SE NE 8-Q-20, dry, TD 2,798 ft.

Coy Oil Co. 1 Banks, EL NW NW SE 6-Q-25, dry, TD 2,388 ft.

American Petroleum Co. 1 Billings, NW SE NW SW 14-Q-26, dry, TD 2,245 ft.

Hopkins County: H. Bailey 1 Logan, SL NE SW SE 21-J-22, dry, TD 2,061 ft.

Union County: F. J. Fleming 1 McElroy heirs, NE SW SW SE 17-O-18, dry, TD 2,760 ft.

Webster County: Basin Drilling Co. 1 Jones, NW SE NW NE 15-M-25, dry, TD 3,050 ft.

MICHIGAN SUCCESSFUL WILDCAT

Ogemaw County, Churchill Township: J. O. Mutch 1 State-Churchill, SW SW SW 31-22n-3e, 20 bbl. from Detroit River pay, TD 3,637 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Otsego Township: Tri-County Development Co. 1 Newton-Schelb Comm., SW NE NW 22-1n-12w, Traverse 1,369 ft., dry, TD 1,380 ft.

Barry County, Thornapple Township: H. R. Fothergill 1 Myers, NW NW NW 3-4n-10w, Traverse 1,943 ft., dry, TD 1,973 ft.

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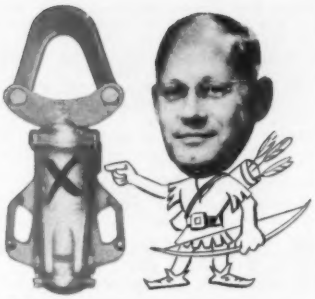

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Clare County, Garfield Township: Sam Hindman 2 Grey, N½ NE NW 34-17n-6w, Dundee 4,002 ft., dry, TD 4,017 ft.

Mason County, Summit Township: Leonard Oil, Inc. 1 VanNortwick, SW SE SW 13-17n-18w, Dundee 2,237 ft., dry, TD 2,274 ft.

Hamlin Township: Taggart Bros. Gas Co. 1 Degen-Phillips, NW SE NE 27-19n-18w, dry, in basal Salina-Niagaran, TD 4,417 ft.

Appalachian-Ohio

Roane County Test Finaled As Dry

PITTSBURGH. — Spencer district, Roane County, West Virginia: Godfrey L. Cabot, Inc., 1-1393, S. M. Swisher, elevation 900 ft., resulted in a dry hole, Corniferous lime 5,540 ft., Oriskany sand 5,708 ft., show gas 5,709 ft., water 5,720 ft., TD 5,725 ft. Newark district, Wirt County, Hope Natural Gas Co. No. 9765 T. M. Anderson, was dry, Corniferous lime 5,073 ft., Oriskany sand, 5,275-5,320 ft., TD 5,326 ft. Union district, Preston County, Cumberland & Allegheny Gas Co., 488 was acidized twice and gaged 225,000 cu. ft. gas, Corniferous lime 4,863 ft., Oriskany sand 5,074-5,277 ft., gas 5,166 ft., TD 5,233 ft. This company's 484 T. Lewis which gaged over 2,000,000 cu. ft., gas in the Oriskany sand, now tests 823,000 cu. ft., and is drilling at 5,087 ft. No. 2-496 topped the Oriskany sand at 4,900 ft.

Maryland.—Garrett County: Eberly & Snee 1 McCullough heirs, has resumed drilling and is at a depth of 7,171 ft. Their 1 Ross Lichty, is running tubing and will be acidized. The present depth is 4,177 ft., W. H. and A. A. Rader 1 Pleasant Valley Church, is cleaning out after shot.

Southwest Pennsylvania. — Unity Township, Westmoreland County, Southwest Pennsylvania, Peoples Natural Gas Co. 4003 A. J. Dotterway, is drilling at 8,712 ft., and 4008 J. R. Frola, is at 7,309 ft. Greenville Township, Sommerset County, New York State Natural Gas Corp. 1-320 M. V. Newman is drilling at 830 ft.

OHIO

Waverly Oil Works widened their Hanover pool by moving out a location to the north on 7 Cartnal Bros., 2nd Gr., Hanover Township, Licking County. Clinton sand at 2,817-60 ft. made 400,000 cu. ft. with a good showing of oil natural, and 106 bbl. the first day after shot.

Another addition to the northeast part of Mt. Zion pool was completed by the Wray Drilling Co. on 3 Jacob Burch, Section 18, Jackson Township, Knox County. Clinton at 3,005-59 ft. was shot with 140 qts. and made 175 bbl. in 24 hours.

R. M. Lee et al are drilling a wildcat, Clinton test, on F. P. Beery, Section 33, Falls Township, Hocking County.

Hope Gas Co. has reached the Ohio shale in a wildcat planned to test the Clinton sand on 1-C Homer Guiler, Section 25, Center Township, Noble County. The Morrow Oil and Gas are below the Berea sand on a wildcat in Section 13, Perry Township, Coshocton County, on S. D. Conard.

Oxford Oil Co. completed another addition to Flint Ridge pool in Hopewell Township, Licking County. The producer 3 F. R. Clag-

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gett, Section 19, logged the Clinton sand at 3,076-3,119 ft., and made 80 bbl. in 24 hours after shot.

Rocky Mountain

Weston County Wildcat Draws Considerable Interest

DENVER.—Commercial tests at a wildcat south of the South Clareton area of Weston County, Wyoming has turned new attention to the east side of the Powder River basin, where Mush Creek and other important discoveries excited considerable interest about 5 years ago.

Big Horn-Powder River Corp. and J. D. Sprecher reported a flow of 589 bbl. of approximately 44°-gravity oil through ¾-in. choke at the 1 Wakeman, NE NW NE 1-42n-66w, in the Wildcat Creek area. Production is from the Newcastle sand in the zone 6,678-84 ft. Approximately 1 mile separates this well from South Clareton field where a majority of the development drilling on the east side of this basin has been done in recent months.

A possible new area of equivalent importance to that of the several discoveries in Weston County some years ago may be indicated in the current test.

Sinclair Oil & Gas Co. has recovered mud with distillate and gas cut from the Phosphoria, between 10,335-55 ft. at the 1 Unit, SW SE SW 21-33n-95w, in the North Sand Draw area of Fremont County, Wyoming. The well is to drill ahead to test Tensleep. Both Phosphoria and Tensleep are productive in Sand Draw field proper.

In western Wyoming Cities Service Oil Co. has completed unitization of a 26,564-acre block in the Cliff Creek area of Sublette County, and will drill a wildcat on the block within 6 months. The block is on the north edge of the Green River basin, in an area which has had no previous deep tests.

Unconfirmed reports from two wildcats on western edge of the Anadarko basin have aroused interest of Rocky Mountain operators in the possibilities of that portion of the basin which lies in Baca and Prowers counties, Colorado. Both wildcats are being drilled tight, with official reports by operators neither confirming or denying reports of indicated success in the wells. Lotus Oil Co. is drilling below 4,100 ft. at the 1 Fee, C NW NW 14-23s-46w, near the town of Lamar in Prowers County, Colorado. The well is reported to have tested shows at about 3,600 ft. in Kansas City lime with recovery of a fair amount of gas.

Slightly more than 90 miles southeast of the Colorado wildcat Columbian Fuel Co. is plugged back to 4,634 ft. at 1 Purdy, C NW SE 20-6n-9e, Cimmaron County, Oklahoma. Reports indicate that this well made 2 to 4 million cubic feet of gas per day on drill-stem test of the Keys at about 4,550 ft. Total depth is 5,020 ft. with casing landed at 4,660 ft. The two wildcats span the possibly productive area of the Anadarko basin in Colorado.

In Kimball County, Nebraska, another potential discovery in rank territory south of Dix pool is preparing to test after cores analysis of recoveries from the "J" sand showed commercial possibilities. Anderson-Prichard & Rogers Oil and Bert Wheeler have run casing and will perforate for first tests of the "J" at 1 State, NW NW NW 36-15n-56w.

A second show is reported in the Coalmont anticline area of Jackson County, Colorado. Hiawatha Oil & Gas and Penn-Ohio Oil have reported recovery of limestone with staining and oil in vertical fractures from the zone 6,855-75 ft. in 2 Government, C SW SW 25-7n-81w. The well is an extension from a recent wildcat discovery in this area by Hiawatha. Production in the discovery was at the rate of 65 bbl. of oil per hour on initial tests and was reported from Frontier sand with total depth at 6,920 ft.

Several developments of importance are currently reported from Utah. In the Uinta basin Continental Oil Co. has completed 1 Chapita Wells, SE SE NW 16-9s-23e (SLM) for a gage of 62 bbl. of oil, 3 of water and 275 M.c.f. gas per day through 14/64-in. choke in 4 hours. The well is producing from Mesaverde sandstone, topped at 6,820 ft. The wildcat is of importance as the first commercial completion from this horizon in Utah. Production in Mesaverde is found to the east of the present completion in the Hell's Hole area of Colorado.

In Carbon County, Three States Natural Gas Co. has reported open flow of 42,000,000 cu. ft. of gas per day from the Ferron sand at the 8 Utah Fuel, SW SW 18-3s-7e in the Clear Creek area. The well is 5 miles north of production which opened this area in a discovery made in 1951. Three States is running tubing with total depth at 4,390 ft. The company has three additional locations staked in the area, and the possibilities of a major gas producing area are being considered by operators in the region.

Tests reported "encouraging" have been made at Equity Oil Co.'s 2 Unit, NE NW 4-16s-12e in the Mounds area of Emery County, Utah. The wildcat is tight, with only total depth of 4,678 ft. released. Shows of both oil and gas are reported, and commercial success would indicate a development of importance to the central Utah area.

COLORADO WILDCAT FAILURES

Lincoln County: Roden, Darden & McRae 1 Baughman, SE SE SW 1-7s-52w, dry, TD 4,195 ft.

Logan County: Falcon Seaboard 1 Walter, NE SE SE 26-8n-55w, dry, TD 5,620 ft.
Don M. Rounds 1 McEndaffer, NE NE SW 10-10n-55w, dry, TD 5,705 ft.

Morgan County: Anschutz & Argo 1 Scott Wolever, NE NE SW 31-6n-55w, dry, TD 5,606 ft.

Prowers County: Charles A. Wallace 1 Witte, SE SW SW 12-24s-44w, dry, TD 6,575 ft.

"Pardon me—are you going to be around for a few minutes?"

Washington County: Shamrock Oil & Gas Co. 1 R. Shaffer, NE NW SE 3-4s-49w, dry, TD 3,600 ft.
Shamrock Oil & Gas Co. 1 Cecil, SE SW NE 11-4s-49w, dry, TD 3,555 ft.
Reco Oil & Eddie Fisher 1 "A" Frasier, NW NW NE 34-4s-56w, dry, TD 5,152 ft.

Weld County: Morris Mizel 1 Furrow et al, SE SE NW 5-5n-61w, dry, TD 6,897 ft.

WYOMING WILDCAT FAILURES

Converse County: Kirby Petroleum Co. 1 Jenkins, Lot Sec. 13-32n-72½w, dry, TD 3,688 ft.

Fremont County: Wind River Oil Co. and Slick-Moorman, R. R. Rutherford 2 Government, NE SE NW 15-33n-99w, dry, TD 3,264 ft.

Hot Springs County: J. W. Bales 3, SE SW SW 28-43n-93w, shut down for winter, TD 1,205 ft.

Johnson County: Williston Oil & Gas Co. 1 Government, SW SE NE 3-42n-80w, dry, TD 2,506 ft.

Sweetwater County: Mountain Fuel Supply Co. 1 Horse Shoe Creek unit, SW NE NW 13-12n-101w, dry, TD 6,488 ft.

NEBRASKA WILDCAT FAILURES

Cheyenne County: Ben Brack 1 Webb, SW SW SW 1-13n-52w, dry, TD 5,402 ft.

Furnas County: Eddie Fisher and Al Ward 1 Dusenberry, SW SW NW 23-1n-22w, dry, TD 3,597 ft.

Kimball County: Balderson & Nyberg 1 Fuller, NE NE SE 13-13n-57w, dry, TD 7,048 ft.

Morrill County: Chicago Corp. and Republic Natural Gas Co. 1 Hinman, NE SE SE 31-19n-49w, dry, TD 4,031 ft.

UTAH SUCCESSFUL WILDCAT

Uintah County: Continental Oil Co. 1 Chapita Wells, SE SE NW 16-9s-23e (SLM), flowed 62 bbl. of oil and 275 M.c.f. of gas in 4 hours through 14/64-in. choke, Mesaverde discovery, new field, Mesaverde 6,920 ft., TD 9,517 ft., PBTD 8,307 ft.

UTAH WILDCAT FAILURES

Sevier County: Condor Petroleum 1 Pierce, C SW SW 12-22s-4e, dry, TD 3,973 ft.
K. D. Owen 1 Government, NE SW NE 23-22s-5e (SLM), dry, TD 1,361 ft.

NORTHERN NEW MEXICO SUCCESSFUL WILDCAT

Rio Arriba County: Colorado Oil & Gas Co. 4 Rosa, NE SW NE 37-31n-4w, 171 M.c.f. of gas in 3 hours from Pictured Cliffs 3,724 ft., Pictured Cliffs discovery, TD 4,011 ft.

NORTHERN NEW MEXICO WILDCAT FAILURE

Rio Arriba County: Ellis A. Hall 1 Silver, SE SW SW 20-26n-2e, dry, TD 2,675 ft.

MONTANA WILDCAT FAILURES

Big Horn County: George J. Greer Trustee 1 Ottun, C SW NE 32-1n-34e, dry, TD 5,727 ft.

McCone County: Marigold Oil, Ltd., 1 Farnham, C SW SW 14-25n-48e, dry, TD 8,961 ft.

LEGAL

Sealed bids for oil and gas mining leases on 2,591.89 acres of trust lands on the Crow Indian Reservation, Big Horn County, State of Montana, will be received at the Office of the Superintendent, Crow Indian Agency, Crow Agency, Montana, up to 2:00 o'clock P.M., Montana Standard Time, February 10, 1953. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

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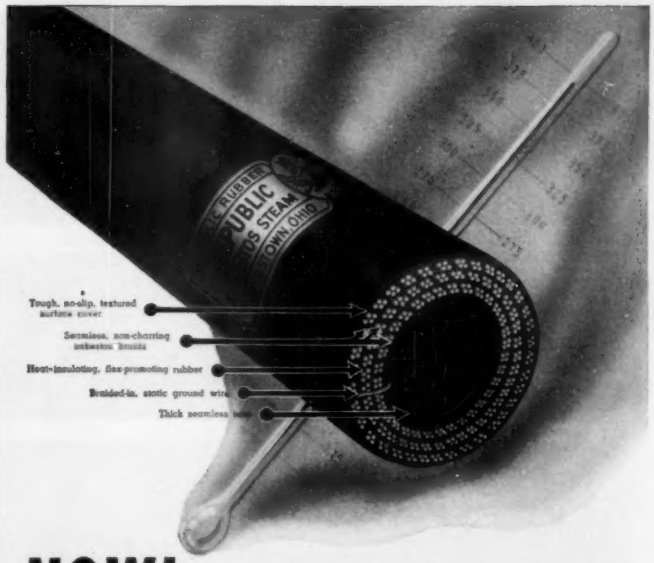

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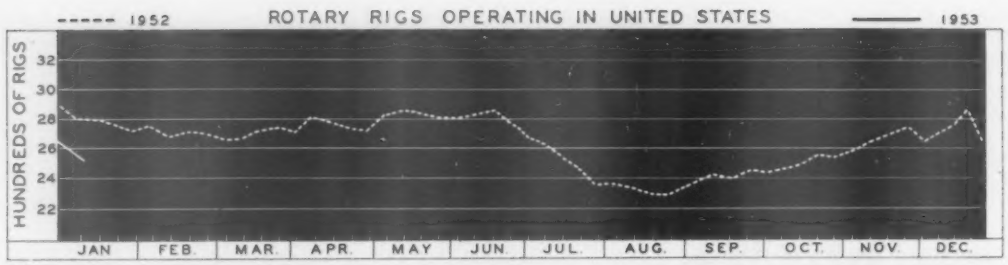
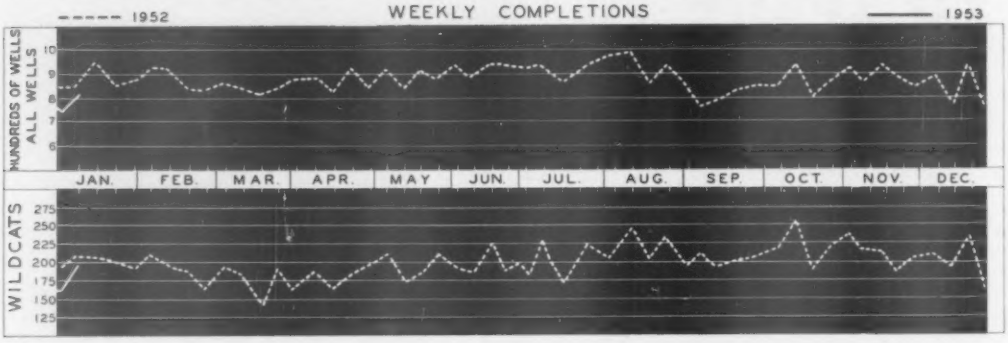




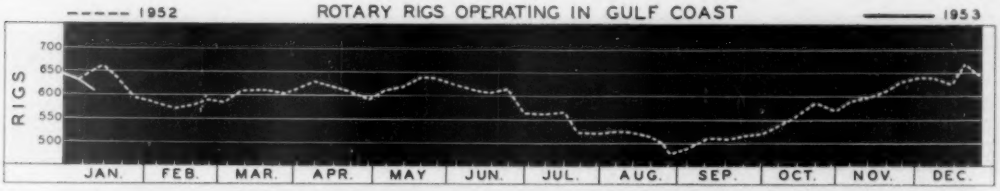
CURRENT STATISTICS

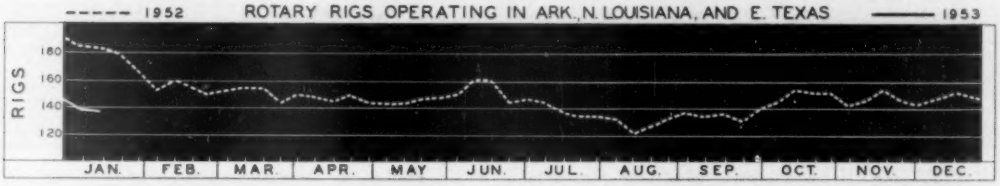
EXPLORATION

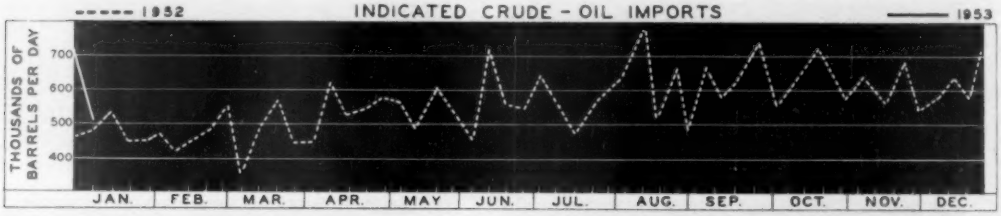
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 10, 1953

	Total of all wells					Jan. 10		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	7	0	*6	21,810	19	11	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	15	3	†14	53,920	48	44	0	0	0	0	0	0	0	2	3	5
West Virginia	9	2	4	3	29,645	12	11	0	0	0	0	0	0	0	0	0	0
Ohio	10	6	2	2	22,755	17	21	0	0	0	0	0	0	0	0	0	0
Indiana	40	15	1	‡24	73,523	44	32	2	0	0	6	8	2	0	0	6	8
Kentucky	43	18	6	19	82,057	47	39	4	0	0	6	10	4	0	0	7	11
Illinois	66	30	0	36	176,722	76	61	1	0	0	14	15	1	0	0	15	16
Michigan	18	8	1	9	45,810	22	19	1	0	0	5	6	2	0	0	7	9
Kansas	59	22	3	34	198,491	80	162	2	0	0	14	16	2	0	0	20	22
Nebraska	9	2	0	7	44,579	11	7	0	0	0	4	4	0	0	0	5	5
Oklahoma	100	58	8	34	323,991	147	211	1	0	1	8	10	1	0	1	11	13
Texas	233	121	11	101	1,103,871	340	454	10	3	2	67	82	15	3	3	92	113
North Central (Dist. 7-B & 9)	64	27	0	37	226,320	99	138	5	0	0	22	27	9	0	0	32	41
West (Dist. 7-C & 8)	52	31	0	21	273,015	79	130	0	0	0	16	16	1	0	0	19	20
Panhandle (Dist. 10)	18	12	6	0	54,484	21	13	0	0	0	0	0	0	0	0	0	0
Eastern (Dist. 5 & 6)	6	4	0	2	27,907	9	15	0	0	0	2	2	0	0	0	3	3
Gulf Coast (Dist. 2 & 3)	41	18	1	22	261,690	60	82	0	0	1	18	19	0	0	1	24	25
Southwest (Dist. 1 & 4)	52	29	4	19	260,455	72	76	5	3	1	9	18	5	3	2	14	24
Louisiana	49	27	2	20	237,056	75	71	0	1	0	4	5	1	1	0	6	8
Northern	29	15	2	12	86,256	47	39	0	0	0	3	3	1	0	0	5	6
Southern	20	12	0	8	150,800	28	32	0	1	0	1	2	0	1	0	1	2
Arkansas	6	2	0	4	26,707	11	14	1	0	0	2	3	1	0	0	4	5
Mississippi	10	4	0	6	74,402	12	9	1	0	0	5	6	1	0	0	7	8
Southeastern States	3	1	0	2	16,253	4	1	0	0	0	2	2	1	0	0	4	5
Montana	11	6	0	5	53,658	16	12	0	0	0	2	2	0	0	0	2	2
Wyoming	16	9	1	6	60,052	21	22	0	0	0	5	5	0	0	0	6	6
Colorado	14	3	1	10	70,035	18	13	0	0	0	9	9	0	0	0	11	11
Utah	4	1	0	3	22,131	4	1	1	0	0	2	3	1	0	0	2	3
New Mexico	36	5	27	4	200,854	39	30	1	0	1	1	3	1	0	1	1	3
California	36	26	0	10	144,089	60	65	0	0	0	9	9	0	0	0	13	13
North Dakota	3	3	0	0	25,576	4	1	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0
Total United States	820	391	70	359	3,107,987	1,128	1,315	25	4	4	165	198	33	4	7	222	266
Total previous week	739	382	44	313	3,056,706			19	1	8	135	163	8	0	3	57	68
Total January 12, 1952	962	523	54	385	3,938,030			29	1	6	169	205	54	3	9	280	346

Service wells included: *6, †11, ‡2.



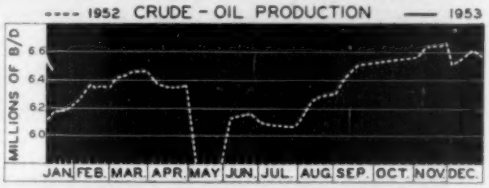


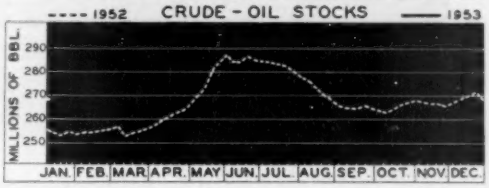


DAILY AVERAGE PRODUCTION FOR WEEK

	January 10, 1953			Jan. 3
	Crude oil	Lease condensate	Total	total
Alabama	3,600		3,600	3,700
Arkansas	76,325	725	77,050	76,600
California	993,300		993,300	991,700
Colorado	85,000		85,000	96,200
Eastern	55,000		55,000	55,000
Florida	1,525		1,525	1,525
Illinois	162,300		162,300	168,000
Indiana	32,900		32,900	33,700
Kansas	315,300		315,300	295,900
Kentucky	30,200		30,200	30,500
Louisiana	655,425	34,650	690,075	687,300
North	111,600	2,650	114,250	113,650
South	543,825	32,000	575,825	573,650
Michigan	33,000		33,000	32,900
Mississippi	91,700	4,450	96,150	95,900
Montana	27,300		27,300	24,200
Nebraska	10,800		10,800	8,300
New Mexico	178,100	450	178,550	176,950
Oklahoma	532,300		532,300	537,700
Texas	2,873,475	48,275	2,921,750	2,975,025
District 1	37,100	250	37,350	38,250
District 2	161,500	5,200	166,700	171,700
District 3	474,250	25,200	499,450	505,650
District 4	257,850	5,900	263,750	269,750
District 5	52,525	350	52,875	54,275
District 6	125,700	5,100	130,800	135,600
East Texas field	262,500		262,500	264,000
District 7-B	111,800	100	111,900	115,625
District 7-C	170,725	5,300	176,025	175,675
District 8	952,275	350	952,625	974,800
District 9	187,500	500	188,000	189,375
District 10	79,750	25	79,775	80,325
Utah	5,200		5,200	4,800
Wyoming	206,500		206,500	222,200
North Dakota	10,500		10,500	11,000
Total U. S.	6,379,750	88,550	6,468,300	6,529,100
Change from previous week, down			60,800	
Canada	143,475		143,475	201,475
Total U. S. production January 1-January 10			64,865,400 bbl.	
Same period last year (crude plus cond.)			*62,031,725 bbl.	

*Includes 944,265 bbl. condensate.



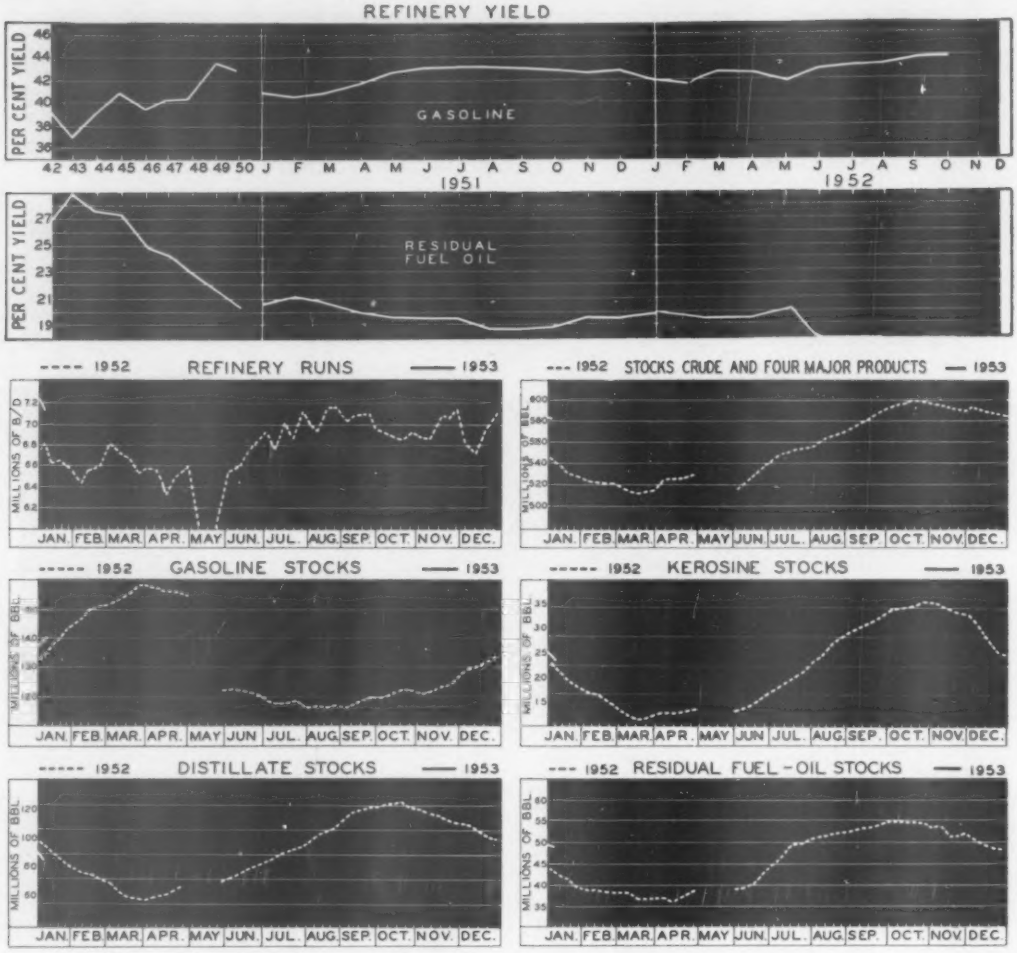


CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	Jan. 3, '53	Dec. 27, '52	Jan. 5, '52
Pennsylvania Grade	2,204	2,169	1,939
Other Appalachian	1,701	1,785	1,778
Illinois, Indiana, Michigan	11,369	10,673	11,951
Arkansas	3,420	3,213	3,029
Louisiana	15,730	15,451	13,077
North	2,583	2,342	2,696
Gulf	13,147	13,109	10,381
Mississippi	3,154	3,060	3,418
New Mexico	7,342	7,427	7,108
Oklahoma and Kansas	35,440	36,763	41,306
Texas	134,034	133,643	123,333
East Texas proper	11,358	11,343	12,778
West Texas	61,850	61,156	54,621
Texas Gulf	25,631	26,452	25,577
Other Texas	35,195	34,692	30,357
Rocky Mountain	14,226	14,431	13,325
California	32,041	31,462	29,638
Foreign	7,619	8,633	5,798
Total	268,280	268,710	255,700

*Bureau of Mines.

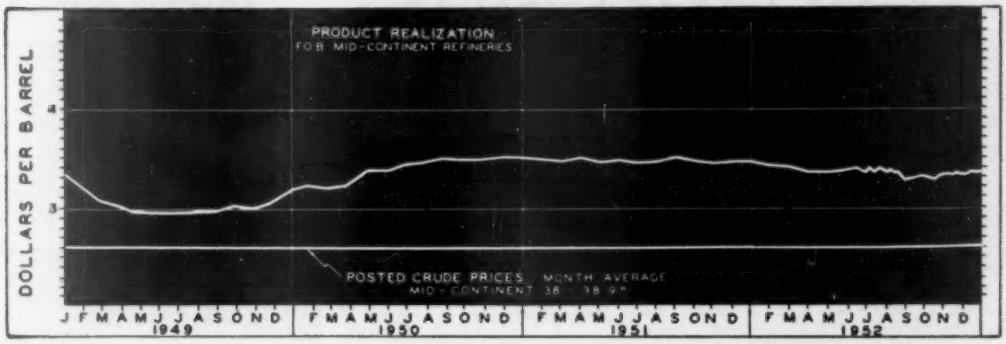

REFINERY YIELD
PER CENT YIELD
GASOLINE
42 43 44 45 46 47 48 49 50 J F M A M J J A S O N D J F M A M J J A S O N D
1951
1952
PER CENT YIELD
RESIDUAL FUEL OIL
---- 1952 REFINERY RUNS —— 1953
MILLIONS OF B/D
--- 1952 STOCKS CRUDE AND FOUR MAJOR PRODUCTS — 1953
MILLIONS OF BBL.
----- 1952 GASOLINE STOCKS —— 1953
MILLIONS OF BBL.
----- 1952 KEROSINE STOCKS —— 1953
MILLIONS OF BBL.
----- 1952 DISTILLATE STOCKS —— 1953
MILLIONS OF BBL.
--- 1952 RESIDUAL FUEL-OIL STOCKS — 1953
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

A.P.I. REFINERY REPORT, JANUARY 10

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,110	419.8	65.7	291.9	279.0	31,889	11,675	34,459	12,575	966	387.9	48.6	244.9	248.4
Appalachian:														
District 1	108	43.7	8.6	19.7	16.7	4,041	486	1,589	630	108	48.3	5.3	18.1	15.1
District 2	86	44.7	7.7	14.6	15.1	1,930	313	584	209	85	40.1	5.8	13.6	18.6
Ind., Ill., Ky.	1,342	685.9	88.0	253.7	201.6	30,633	5,425	17,150	5,110	1,272	648.3	90.9	240.0	187.6
Okla., Kans., Mo.	554	330.0	12.4	131.7	53.9	15,748	1,557	10,758	1,427	529	299.1	17.4	129.0	67.1
Inland Texas	282	193.7	13.6	39.3	44.0	5,566	378	1,710	1,082	241	163.7	13.5	35.2	40.2
Texas Gulf Coast	1,758	850.6	147.9	446.0	276.7	20,101	2,591	11,102	7,062	1,651	752.4	148.7	408.5	260.8
La. Gulf Coast	511	227.0	67.7	106.7	52.0	7,228	1,986	4,029	1,725	515	218.1	68.1	122.6	62.4
N. La. and Ark.	89	36.0	7.7	23.6	6.4	2,798	383	1,011	151	78	33.9	8.7	18.9	7.4
Rocky Mountain:														
New Mexico	17	10.7	.....	2.7	3.9	164	.....	69	39	17	10.4	0.6	2.5	4.0
Other Rocky Mtn.	233	114.3	7.9	45.7	44.3	5,200	329	1,669	956	232	109.1	8.4	48.6	51.0
California	1,027	439.0	0.7	193.7	342.1	15,375	341	10,885	17,910	946	382.4	4.6	174.3	375.6
Jan. 10, 1953	7,117	3,395.4	427.9	1,569.3	1,335.7	140,674	25,464	95,006	48,876	6,640	3,093.7	420.6	1,456.2	1,338.2
Jan. 3, 1953	7,221	3,472.3	425.0	1,565.0	1,360.6	137,016	27,266	100,461	49,459	.....	.....	.....	.....	.....
Jan. 12, 1952	6,625	3,159.0	435.0	1,413.0	1,369.3	138,380	25,005	81,442	42,268	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES, MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.36 for week ended January 3, $3.35 for previous week, and $3.45 for January 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of January 14, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8¾-9	10.5-10.65	9
No. 2 straw fuel oil	7⅝-8	9.6-9.65	8
No. 6 residual	$0.85-1.00	$2.10-2.25	$1.50-1.65

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅞	6¾	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	22-23
200 vis., No. 3 neutral, 0-10 pp.	12-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

INDICATED demand for gasoline for the country as a whole remains high, but the continuing record runs at refineries with the resulting gains in gasoline production have increased gasoline inventories at rates that have tended to soften markets for this product.

The all-time record for refinery production of gasoline was set in the week ended January 3. In the week, refiners produced 24,306,000 bbl. of gasoline, or more than in any week of the third quarter of last year when high summer demands for gasoline were being met out of current production. There have been only three weeks on record when gasoline production exceeded 24,000,000 bbl. and two of these have been within the past month.

Group 3 gasoline markets have been growing softer for the past several weeks. Cycled gasoline prices often indicate a weak gasoline market before lower prices are quoted for refinery-produced gasoline. Cycled gasoline has been soft for some time, and resellers now report extreme difficulty in moving the product at 9 cents a gallon.

Distillate fuels are moving from Mid-Continent refineries but not at a rate that will reduce inventories to normal levels by the end of the heating season. The reason for the lack of movement has been the warm weather in the North Central states, the normal market area for surplus distillate from the Mid-Continent.

Temperatures since the first of September for nine typical metropolitan areas in the North Central states have been almost 11 per cent warmer than last year, based on degree days. Fuel areas in the northeastern states have had weather that was about 1 per cent warmer than last year.

For the week ended January 10 tanker rates were reported down again. Spot rates for Caribbean to East Coast were MC less 20 per cent.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.*
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50 cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Siever Made Sales Manager In Permian Basin Area

F. E. (Ed) Siever has become sales manager for Petroleum Tool Co., and Smith Bit Distributing Co. in the Permian basin with offices in Odessa, Tex. He was formerly division manager for Technical Oil Tool Corp. in West Texas and New Mexico since 1947, and has worked for TOTCO since April 1940. Prior to that time he was employed by Guy H. Hooper Clay Co., Noble Drilling Co., and Houston Oil Field Material Co.

George Kent, Ltd., Becomes Kent-Norlantic, Ltd.

The former Canadian branch of George Kent, Ltd., of London and Luton, England, has terminated its operations at Toronto, and in its place a new and separate Canadian company, Kent-Norlantic, Ltd., has been incorporated and has established a plant and offices at Toronto, Ont.

The Canadian company will be engaged in the distribution, and later, in the assembly and manufacture of domestic and industrial water meters, flow meters, flow measuring tubes for liquids and gases, and instruments and control equipment, similar to those manufactured by the parent company in England.

The board of executives comprises: K. R. Wells, president and general manager; W. G. C. Howland, vice president, and R. G. Kent (sales director of George Kent, Ltd.).

Wells and F. Rose, sales manager, were appointed by the parent company to England. Wells went to Canada 2 years ago as manager of the Canadian branch, and Rose joined him early last year after a decision had been taken to form a separate Canadian company.

Magcobar Promotes McArthur

E. N. McARTHUR

Promotion of Earl N. McArthur, Jr., to district service supervisor in the Victoria, Tex., area for Magnet Cove Barium Corp. has been announced by Ray Dillman, Magcobar Gulf Coast division manager.

McArthur's headquarters will be in Victoria. Previous to his appointment he was a field service engineer in the Victoria area. He was employed by Magcobar in February 1949. McArthur is a graduate of Rice Institute.

Mid-State Chemical Moves To Larger Headquarters

Mid-State Chemical Co. has recently occupied larger headquarters at Mt. Vernon, Ill., according to W. B. (Bill) Porter, president of the oil-field chemicals firm. According to officials of the company, the expansion was necessitated by increased need for services of the company and by broader field distribution facilities.

Mid-State Chemical's new headquarters building at Mt. Vernon, Ill.

Mid-State Chemical, organized shortly after World War II, is engaged in the manufacture and distribution of rust-preventive paints and solvents, paraffin solvents, and water-treating chemicals.

Formerly headquartered in Olney, Ill., the chemicals company, during 1952, has opened sales and service offices in Denver; Tulsa; Wichita; Bismarck, N. D.; Houston; Charleston, W. Va.; and Ardmore, Okla.

Opening of the new headquarters was marked by an open house attended by oil-industry visitors from most of the oil-producing states in the country.

A-1 Bit & Tool Co. Opens New Shop in North Dakota

A-1 Bit & Tool Co.'s new oil-field machine shop at Tioga, N. D.

The A-1 Bit & Tool Co. has built and opened an oil-field machine shop in Tioga, N. D., to take care of the repair needs of the several oil fields in that area.

Based on a 150 by 60-ft. concrete slab, the new shop is equipped with all modern machine tools for the repair of draw works, threading of drill pipe and drill collars, and installation of tool joints. Heavy-duty cranes in the building greatly facilitate the movement of massive parts from one operation to another.

Joe Castles, former district manager for the company at Beaumont, Tex., is now Rocky Mountain division manager with headquarters at Tioga. Harry Dull, formerly with Tex-La Tool Co., Beaumont, is shop superintendent of the new installation.

J. R. Alexander Appointed General Sales Manager

Appointment of J. R. Alexander as general sales manager, Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia, has been announced by T. M. Evans, president.

Alexander, who has been with Quaker since 1944, will be in complete charge of the company's sales activities. He came to Quaker as a sales representative, and has been successively city sales manager and district sales manager until his present promotion. He was also instrumental in establishing the Detroit sales office and warehouse of which he became district manager.

Rockwell Names Walters District Sales Manager

J. H. WALTERS

C. K. Madison, midwestern regional sales manager for Rockwell Manufacturing Co., has announced the appointment of J. H. Walters as Houston district sales manager. Walters will be responsible for the coordination of all meter and valve division sales in the Houston district, which covers sections of Texas and Louisiana.

Walters became affiliated with Rockwell as a sales engineer in 1945, and prior to his recent appointment served as Houston gas sales supervisor.

Canadian Bechtel, Ltd. Names Blair, Roberts

S. M. BLAIR

D. L. ROBERTS

Sidney M. Blair, of Toronto, Ont., and Donald L. Roberts, of Vancouver, B. C., have been elected directors of Canadian Bechtel, Ltd., it was recently announced by Van W. Rosendahl, president of the company. Canadian Bechtel, Ltd., is a subsidiary of Bechtel Corp. Both Blair and Roberts are vice presidents of Canadian Bechtel, Ltd., and in addition, Blair is a vice president of Trans Mountain Oil Pipe Line Co.

Prior to joining Bechtel organization in 1949, Blair had been engaged in the direction of manufacturing, engineering and research activities within the oil industry in England, the Caribbean area, and in Canada.

Roberts joined Bechtel in Edmonton, Alta., in 1942. Since that time, he has been associated with various Bechtel activities throughout the world. Late in 1950 he was placed in charge of preliminary reconnaissance, cost estimating, engineering, design, field surveys, and construction planning of the Trans Mountain project, and since August 1951 he has been Canadian Bechtel, Ltd.'s, project manager for the designing, engineering, and supervision of the 718-mile Trans Mountain oil pipe line.

Republic Supply Will Move to Oklahoma City April 1; James E. Webb to Replace J. H. Lollar as President

An expanded sales and service program was discussed when district managers of Republic Supply Co. met recently with company officials. Shown are J. H. Lollar, Jr., seated; and standing: W. M. Haynes, Shreveport district manager; Raymond Knight, Corpus Christi, Tex., district manager; M. N. Amsden, Wichita Falls, Tex., district manager; P. H. Roberts, Casper, Wyo., district manager; H. B. Catlow, vice president in charge of sales; D. L. Collins, Tulsa district manager; H. L. Ellis, Odessa, Tex., district manager, and H. H. Haire, Salem, Ill., district manager. H. C. Kinney, director of purchases, and Bernard Jones, assistant secretary-treasurer, are not pictured.

GENERAL offices of Republic Supply Co. will be moved from Houston to Oklahoma City about April 1, and James E. Webb, of Oxford, N. C., has been elected president and general manager, effective on date of the transfer, replacing J. H. Lollar, Jr.

Lollar will continue as treasurer and also will become treasurer and a member of the board of Kerr-McGee Oil Industries, Inc.

Republic Supply will maintain its other principal office in Houston with an executive in charge. District offices in Tulsa; Salem, Ill.; Shreveport, La.; Casper, Wyo.; Odessa, Wichita Falls, and Corpus Christi, Tex.; will not be affected.

The new move will place the firm's headquarters in a more central geographic location, and will enable it better to serve customers in the petroleum industry, Lollar said.

Republic Supply has some 50 stores and sales offices in 10 states extending throughout the central part of the United States from the Gulf of Mexico to the Canadian border. Stores and sales offices are located in Arkansas, Colorado, Illinois, Kansas, Louisiana, Mississippi, New Mexico, Oklahoma, Texas, and Wyoming.

During the 42-year life of Republic Supply, it has served the oil and gas industries at more than 100 locations providing all types of equipment required in the producing, drilling, pipe line, and refining branches of the industry.

Republic Supply was organized in Port Arthur, Tex., in 1910, following the discovery of oil at Spindletop. General headquarters were moved to Houston in 1911, and in recent years have been located in the National Standard Building.

Formerly vice president and treasurer of Sperry Gyroscope Co., Webb is

J. H. Lollar, left, and James E. Webb.

a member of the board of directors of McDonnell Aircraft Corp., St. Louis, and of Kerr-McGee, and is a trustee of George Washington University, Washington, D. C. In addition to his industry experience, Webb served for 3 years as Under Secretary of State, resigning about a year ago, and prior to that was director of the U. S. Bureau of the Budget for 3 years. A graduate of University of North Carolina, he also attended George Washington University Law School, and received the honorary degree of LL.D. from the University of North Carolina in 1949, and from Syracuse University in 1950.

Pennsalt Names Agent

The Pennsylvania Salt Manufacturing Co. has announced that Henry S. Rondeau and the Cleveland Industries Co., Cleveland, have been appointed representatives for Pennsalt's corrosion engineering products in Ohio and northern Kentucky.

This organization will be agents for Pennsalt's corrosion-resistant cement mortars and coatings for construction, chemical and allied, petroleum and petrochemical, and primary and secondary metals in this territory.

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1 OILWELL Steam Pump, 16¼ x 7¾ x 20". This pump is in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

STORAGE TANKS — FOR SALE: 55,000 bbl. steel tanks with steel roofs. Located Henrietta, Texas, on Railroad siding. Jimmy Heath, Henrietta, Texas.

2,500 FT. Fred Cooper Rotary mounted on a low boy trailer. 7½ x 10 Gaso Mud Pump powered by Model L Allis-Chalmers Engine. All propane equipped. Unit was purchased new in August 1952. 17,050 ft. of 3½-in. drill pipe and one 4¾-in. drill collar. Doghouse, water tank, and all necessary small tools. Will furnish contracts for part of purchase price. Contact Bert Young, Box 311, Eureka, Kansas, or Phone 141.

FOR SALE: 1 43 Star spudder complete with tools. Price $6500.00. Four miles east of Delaware, Oklahoma. Call Tulsa 3-0390. After five 54-1488. C. L. Sutton.

ROTARY drilling rig, capacity 2500 feet, complete with 2450 feet of 4½" drill pipe. Bargain. Call or write Mr. Winget, Iverson Supply Company, Farmington, New Mexico.

FOR SALE: 8—Shriver 42"x42" cast iron Filter Presses, Plate & Frame type, 18, 27, and 54 chambers, 1" cake; 15—Sperry 18"x18" cast iron Filter Presses, 11 chambers; 2—#12 Sweetland Filters for 36 leaves on 4" centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

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3—Bessemers Type X 200 H.P.
1—Clark 200 H.P.
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1—Bessemer Type X, 100 H.P.
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Tulsa, Okla.
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WELL drilling equipment, new or used Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

RECONDITIONED Pumping Engines and Light Plants. XAHU Waukeshas, U-2 and U-4 Internationals, 1½ K.W. Kohlers. Completely rebuilt and guaranteed. These are bargains. Delk's Repair Service, Box 429, Great Bend, Kansas. Phone 4095.

KEYSTONE 50-A spudder. Complete with or without tools. Mounted on International K-7 truck. Complete $7000.00 or will sell less truck and tools. Lepley and Walls, RD 2, Titusville, Penna.

FOR SALE: R. L. Dubbledrum Cardwell fully equipped. Oklahoma City, Oklahoma. Melrose 8-9234.

FOR SALE: Landis Pipe machine, 2" to 8⅝", perfect condition, latest model, complete with grinder, automatic throw-off and dies. Has done very little work. $7,000.00 FOB Wichita Falls, Texas. Frontier Supply Company, P.O. Box 1897, Wichita Falls, Tex.

API STANDARD EXTERNAL UPSET TUBING

We offer for sale a complete facility for finishing oil country drill pipe and tubing to API Specifications. Present setup is for 2⅜" O.D. API Standard External Upset Tubing. Range can be adjusted, with additional dies, to accommodate 1" O.D. to 5" O.D. tubing. Facility can be inspected in operation at our plant, Versailles, Pa. Write for descriptive prospectus.

Mr. W. J. Cornelius
A. B. MURRAY CO., INC.
P.O. Box 476, Elizabeth, New Jersey

Cuts Drilling Cost!
ARMITE DRILL COLLAR & TOOL JOINT COMPOUND
ARMITE LABS., 6009 Broad St., Los Angeles 1, Calif.
J. B. Carver Jr., 1103 E. Maple, Midland, Tex.

EQUIPMENT FOR SALE

FOR SALE OR TRADE: 3½", 4", 4½" OD Sonoscoped Drill Pipe. Complete Rotary Rig and Equipment. Nat'l 3 Cable Tools, R L Cardwell Spudder. Cable Tools from 5½" to 18". Milford Giffin, 477 Hoisington, Kansas.

2 FAILING Model 1500 drills, shop number 986 mounted on KBS-7 1947 International truck, shop number 909, of special design mounted on GMC 6 x 6. Both drills in good condition and reasonably priced. Write for prices and list of equipment, Box G-193, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 40,000 ft. #1 3½" O.D. standard plain end line $0.55 per ft. 20,000 ft. 4" O.D. flues. Rogers Pipe and Supply Company, Phone 5-6850, Tulsa, Oklahoma.

6½" X 2¾" X 5½" Gardner Denver Vertical Duplex two stage water cooled compressor. Happy cooler. Skid mounted with Waukesha engine. Located Walnut, Kansas. Call Dallas, Texas, RIverside 6811.

DIESEL Electric Generator Unit like new. Total 746 hours operating time—37½ KVA, 3 Phase, 60 Cycle, 220/440 Volts, 1800 RPM, Century Generator, direct connected to 72 H.P. Model 6DTG317 B/M #D3076, Buda Diesel. Located on our Ducommon Lease, Section 26, T6N., Crawford County, Illinois. Price $3,000.00. Red Head Oil Producing Company, Brilliant, Ohio.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

NEW STEEL PIPE

79,000 lin. ft. steel pipe, electric welded 24" diameter, 40 ft. lengths, 930 lb. test pressure, plain ends. Immediate delivery.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St., Chestnut 4474, St. Louis 1, Mo.

FOR SALE

25,000'—4" OD, plain ends, 10 ga. wall, 5.58# 1200# test x 40' electric weld pipe.
50,000'—4½" OD, 10.79#, .237" wall x 40' standard API. line pipe beveled for welding.
1,200'—16" OD, 82.77#, .500" wall, plain ends, x 40' seamless pipe.
All available in Oklahoma City.

HORWITZ PIPE & STEEL CO.
Oklahoma City, Okla. 425 S. Western, CE 2-7591

EQUIPMENT FOR SALE

CASING—7" OD 26# Grade J55 Youngstown Range 3 with Hydril Speedite Threads, Streamline, 5300 feet, located Magnolia, Arkansas. Condition like new. Price OPS ceiling. Contact Sam Siegel, Phone 4-6512, Shreveport, Louisiana.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED — 36L Bucyrus - Erie Spudder with top to bottom tools. Mail inventory and price to 152 N. Emporia Street, Wichita, Kansas.

TO RENT or purchase on rental basis, one complete 3000-4000 jack-knife rotary rig, 4½" drill pipe, 12" or 14" pump for use in Dallas area. Give description, location, age, price. Texas Water Wells, Inc., 951 McCarty, Houston, Texas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED—DRILL CASING

API casing need quick delivery up to 2,000 feet seamless 7" OD 23 lbs. per foot J-55 long couplings lengths Range 2. Telephone New York collect, Digby 4-3340.

HELP WANTED

OIL Industry Employment Service, 403 Fuloma Bldg., Tulsa, Okla. 4-5074. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

GEOLOGIST wanted to headquarter in Denver with independent oil company. Must have well sitting, sample examination and mapping experience, and at least two years experience in Rocky Mountain Area. Reply will be kept confidential. Box G-264, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 434 Frick Bldg., Pittsburgh 19, Pa.

GEOLOGIST

Independent oil company has opening for experienced, capable sub-surface geologist. Must be thoroughly familiar with Oklahoma and should have working knowledge of Mid-Continent Area. Good position for right person. In applying, give past employment record, educational background, and age. All replies strictly confidential. Box G-275, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY

Required By

TEXAS GAS CORP.

Apply R. M. Riggins, President, or W. N. Bonner, Jr., General Counsel, 17th Floor, Prudential Building.

Phone—Ly3628 Houston, Texas

HELP WANTED

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST with Canadian or Rocky Mountain experience wanted by independent oil company to headquarter in Calgary. Replies will be kept confidential. Box G-265, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer. Young man preferably experienced water flooding for independent oil company, location North Texas. State experience fully. Salary expected. Box G-251, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: At least 25 well experience in Kansas. Good opportunity for ambitious man. Petroleum, Inc., 305 E. Third, Wichita 2, Kansas.

CHEMICAL ENGINEER for design and/or field installation of gas process equip. At least 2 years exp. in plant process or construction. Leading S. W. Manufacturer. Box G-270, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SECRETARY: Age 35 to 45, for independent oil company in Oklahoma City. Must be expert stenographer, well experienced in oil production and operations. Must have excellent character and references. Sal. $350 per mo. with raises commensurate with ability. P.O. Box 1824, Oklahoma City, Okla.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

..DISTRICT..

ELECTRICAL ENGINEER

Major Oil Company has opening for graduate electrical engineer with 7-10 years experience, to take charge of planning, coordinating, and expediting of all electrical engineering and construction work in an operating district in Venezuela.

Write giving full details of experience, etc., to

P. O. BOX NO. 35

BOWLING GREEN STATION

NEW YORK 4, N. Y.

HELP WANTED

..CONSTRUCTION PERSONNEL..

for

PETROLEUM REFINERY CONSTRUCTION

——JOB SUPERINTENDENTS——

——FIELD ENGINEERS——

——PROJECT COORDINATORS——

——ELECTRICAL ENGINEERS——

Petroleum refinery-chemical plant construction engineering experience required. Married men with accredited degrees in civil, mechanical, chemical or electrical engineering preferred, but some college training with heavy refinery construction experience excepted in lieu of degree.

State position applied for and mail complete chronological resume of education (including schools, colleges attended, degrees received) employment (including positions held, nature and locations of projects supervised), foreign languages spoken and how well, salary history and salary requirement.

Positions offer excellent salaries plus subsistence allowance. Outstanding opportunities with leading, progressive and expanding firm of engineers-constructors in petro chem field with domestic and international activities.

Applications are confidential. Interviews arranged in NYC and immediate families of selected applicants relocated at our expense.

Applicants considered only on basis of complete information provided. Write Personnel Department:

HYDROCARBON RESEARCH, INC.

115 Broadway New York 6, N. Y.

GEOLOGIST

Required By

TEXAS GAS CORP.

Apply R. M. Riggins, President, or J. T. Ashford, Vice President, 17th Floor, Prudential Building.

Phone—Ly3628 Houston, Texas

GEOPHYSICAL SERVICE

WHY DRILL DRY HOLES! PROVEN GEOPHYSICAL INSTRUMENT has definitely located commercial wells. Make exact drilling locations. Determine approximate depth and thickness of oil pay zones. Efficient-economical service WORTH INVESTIGATING! YOUNG AND CRITCHLOW, 2031 NW Johnson, Portland, Oregon.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 1638, Ph. No. 3-3141, Hobbs, New Mexico.

OFFICE MANAGER-MATERIAL MAN—11 years' experience in procurement, warehousing, distribution of oil-field materials; perpetual inventory systems, payroll, drilling, production and pipeline records. Age 36. Box G-239, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer — Seven years diversified experience with major. Desire responsible position with independent operator or drilling contractor. Box G-250, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Engineer—Experienced in design, construction and maintenance supervision of fluid and Thermofor crackers, pipe stills and product treating. Age 29. Desire relocation midwest. Box G-248, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGICAL engineer, now employed, age 29, veteran 2½ years subsurface and well-sitting with independent. Prefer position in Rocky Mountains or West Texas-New Mexico areas. Box G-266, The Oil and Gas Journal, Tulsa, Oklahoma.

DISTRICT GEOLOGIST desires change. Twelve years' experience in Illinois, Texas, Oklahoma. Six years in supervisory capacity. Excellent references. Prefer position in Denver Area but will consider any position which permits time for constructive geology. Box G-240, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, age 32, 7 years varied experience. Drilling and Production Gulf Coast area. Desire position with expanding organization. Box G-267, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Production Engineer. Age 32. Seven years major company experience in production and drilling operations. Desires responsible position with active independent. Box G-268, The Oil and Gas Journal, Tulsa, Oklahoma.

CPA wishes to make connection with progressive firm. Fully qualified, dependable. Would move to any location. Box 1324, Denver, Colo.

EXECUTIVE SECRETARY, English-Spanish-French. Secretary of refinery and pipeline company terminating operating contracts desires responsible position overseas or U. S. Six years experience foreign administration petroleum construction and operation, labor, material, public relations. Box G-269, The Oil and Gas Journal, Tulsa, Oklahoma.

GULF COAST LANDMAN age 36 presently employed. Fifteen years land experience all phases. Experienced in position District Manager integrating geological and production personnel. Proven administrative ability. Desires medium sized well financed company or substantial independent. Box G-274, The Oil and Gas Journal, Tulsa, Oklahoma.

PILOT POSITION WANTED
Fully qualified and experienced executive pilot desires position with stable oil company. Highest character and ability references, age 37, married. Over 5000 hours experience domestic and overseas, including transocean. Box G-273, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY, LANDMAN: L.L.B. from Canada; Doctor of Law from University of Chicago. U. S. and Candian oil company experience in legal and land work. Presently employed in Oklahoma. Desire position with opportunity for advancement—either domestic or foreign. Box G-257, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 1950 graduate, 31, married, child, locate anywhere, limited experience, desires position requiring initiative, responsibility, integrity, hard work; offering opportunities for learning, acquiring practical experience, earning advancements. Box G-256, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MECHANICAL ENGINEER—BSME, JUNE 50—Age: 27—Single—Veteran—Desires foreign employment—Europe or Latin America—One year experience in machinery manufacturing. Presently employed by oil company. Resume upon request. Box G-255, The Oil and Gas Journal, Tulsa, Oklahoma.

AGGRESSIVE landman and attorney. Four years experience. Desires connection with company or independent in job of responsibility and future. Excellent references. Box G-263, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Geologist, Age 47, married, now in consulting capacity, wishes to reenter Oil Company, staff, research or coordination; subsurface geology, paleogeography, geophysics. Prefer foreign; would consider domestic. Box G-262, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

INCORPORATIONS

DELAWARE CORPORATIONS FORMED & SERVICED. Commonwealth Trust Co. P.O. Box 350, Wilmington, Delaware.

REAL ESTATE

OFFICE space for rent—building under construction—will make changes for tenant—all on ground floor—one block from main street, close in. Forced air heat—air conditioned — well lighted — total of 17 rooms — contact Adam L. Krause, 1319 Main, Great Bend, Kans.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

BUSINESS OPPORTUNITIES

YOU PROVIDE leases or production. We supply $200,000. Hoge, 405 E. 54th, New York City.

FOR SALE

Franchises on a new high-speed drilling machine for drilling oil wells deeper and faster. Will drill oil, wells and prospect holes in the most economical way.
A PERCENTAGE OF OIL to franchise holders for promoting drilling demonstrations with this drilling machine.

FRANCHISE DISTRICTS FOR SALE

No. 1—California, Oregon, Washington.
No. 2—Montana, Idaho, Wyoming.
No. 3—Nevada, Utah, Arizona.
No. 4—Colorado, New Mexico.
No. 5—North Dakota, South Dakota, Minnesota.
No. 6—Nebraska, Kansas, Iowa, Missouri.
No. 7—Texas, Oklahoma.
No. 8—Louisiana, Arkansas, Mississippi.
No. 9—Illinois, Indiana, Kentucky.
No. 10—Michigan, Wisconsin.
No. 11—Alabama, Tennessee, North Carolina, South Carolina, Georgia, Florida.
No. 12—Ohio, Pennsylvania, West Virginia, Virginia.
No. 13—New York, New Jersey, Delaware, Maryland.
No. 14—Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, Maine.
No. 15—Alaska.

BASIC PATENT ON DRILLING MACHINE

Box G-272, The Oil and Gas Journal, Tulsa, Oklahoma

ROYALTIES

JACK EAGLE—Pay you immediately for your producing royalties and Overrides, absolutely no delay, send complete details 706 City Nat'l Bldg., Okla. City, Okla. REgent 6-7027.

ROYALTIES

PRODUCING royalty for sale, 1⅛ acres, paying approx. $155.00 per month, 4 wells, WILCOX SAND. Lease making approx. 12,000 bbl. oil per month. NW NW S27-T17N-R1E, Logan County, Okla. (Haynes Tract). Price $8,150.00. Box G-246, The Oil and Gas Journal, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

ROYALTIES WANTED

Producing Royalties
High Grade Only
Send Full Particulars
Address

C. C. HARMON
719 World Bldg., Tulsa, Okla.
P.O. Box 2151

LEASE AND DRILLING BLOCKS

DALLAM COUNTY, TEXAS: 8000 acres solid block one owner. ½ County leased to Major Companies. $1.25 bonus, $1.00 rentals, 10 year commercial lease. Combest Royalty Company, Amarillo, Texas.

NOTICE
Can deliver a new Oil & Gas lease on Four Hundred Thousand acres solid block, in New Mexico. Box G-276, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE OR LEASE, oil and gas leases, oil reserves, and drilling propositions. In Illinois basin, production in, Pennsylvania production to be expected 100 to 35 barrels per day in this formation. Lease offsets discovery lease, depth of production 635 ft. Production in Devonian and in upper Silurian reef formation in this area. Box G-271, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING two wells in Williston Basin, North Dakota. One in Sec. 23, Twp. 159N, R 94W. The other in Sec. 35, Twp. 158N, R. 93W. Both near Amerada Co. Production. Deals partially financed, balance of interest in one or both deals for sale by responsible Oil Producer. Box G-259, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

5000 ACRES-2800 acres GRAY COUNTY, TEXAS, Semi-proven oil and gas 3000'. Small cash bonus and little override. 5 year commercial lease $1.00 rentals. Combest Royalty Co., Amarillo, Texas.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NE¼ sec. 30, T. 33 S., R. 40 W., 6th P.M., Kansas, within the known geologic structure of the Hugoton field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, on February 4, 1953, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

Wickwire Spencer Appoints Densmore Manager

Sam W. Densmore's appointment, effective January 1, 1953, as warehouse manager for the Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corp., was announced by H. C. Allington, general manager of sales, at the executive offices of the corporation, New York City.

In 1928 Densmore joined the then Wickwire Spencer Steel Co. With the exception of a tour of duty of 4½ years during World War II, he has served in various capacities in C. F. & I.'s New England mills. His most recent position was that of New England district sales manager. He will headquarter in Boston.

The position of warehouse manager has been created to standardize warehouse procedures and operations within the Wickwire Division.

Hyatt Names Webster Head Western Division Sales

F. H. Webster has been appointed manager of Hyatt's western division sales office in Chicago, as announced by J. R. Gilmartin, general sales manager, Hyatt Bearings Division, General Motors Corp., Harrison, N. J. Webster succeeds C. L. Newby, who has retired after 34 years of service with Hyatt in several sales capacities.

Webster, prior to this appointment, was assistant manager of Hyatt's western sales division in Chicago. He was originally with the Pacific Coast office, and has served on various sales and engineering assignments there, the Southwest, and the Chicago territory for the past 27 years.

Vapor Heating Appoints Keeran Executive Engineer

Vapor Heating Corp., Chicago, has announced the appointment of William C. Keeran as executive engineer. In making this appointment A. D. Bruce, president, stated Keeran will supervise all phases of engineering, research, and design of the company's products.

Keeran will also continue as vice president in charge of Roth Manufacturing Co., Chicago, a wholly owned manufacturing subsidiary of Vapor Heating Corp.

Keeran has been with Vapor 11 years with a background of engineering and production with other companies after receiving his master's degree in engineering from Northwestern University.

ADVERTISERS IN THIS ISSUE

Alten Foundry & Machine Works 188
Amercoat Corporation 36
American Iron & Machine Works Co. 42
Anchor Petroleum Company 54
Anglo-Iranian Oil Company, Ltd. 128

Baash-Ross Tool Company 111
B and W Incorporated 172
Baird Mfg. Co. 172
Baker Oil Tools, Inc. 52
Beaumont Iron Works, A Subsidiary of American Locomotive Co. 90
Bendix Aviation Corporation 39
Bethlehem Steel Co. 73
Black, Sivalls & Bryson, Inc. 38
Buffalo Forge Company 27
Burgess-Manning Company 9
Butler Manufacturing Co. 122
Burton Delingpole & Co., Ltd. 79
Byrd, B. E. 155

Carbide and Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 46
Carter Company, Inc., S. C. 44
Caterpillar Tractor Co. 11
Charles Machine Works, The 147
Chase Brass & Copper Co. 26
Chiksan Company 35
Cities Service Oil Co. 32
Classified Advertising 188, 189, 190
Cleaner Pipelines Co. 147
Coffing Hoist Company 117
Crane Co. 5
Crescent Plastics, Inc. 185
Cross Manufacturing Co., Inc., M. J. 151

Darling Valve and Mfg. Co. 117
Dean Brothers Pumps, Inc. 149
Desco Service Co. 154
Dolge 165
Dowell Incorporated 76, 77
Drilling & Service, Inc. 178
du Pont 19, 20
Dynamatic Corporation, Subsidiary of Eaton Manufacturing Company 176

Eaton Manufacturing Company, Axle Div. 175
Elliott Company 33
Empire Trust Company 172
Enardo Manufacturing Co. 166
Filtrol Corporation 124
First National Bank & Trust Co. of Tulsa, The 159
First National Bank of Shreveport, The 149
Fisher Governor Company 22, 23
Flint Steel Corporation 152
Fluor Corporation, Ltd., The 153
Frontier Chemical Company 155

General Electric Co., Electronic Dept. 12
General Tire & Rubber Co., The 118
Glass Fibers, Inc. 150
Goodrich Company, B. F. 3
Gott Mfg. Co., H. P. 114
Grancell, I. H. 158
Grant Oil Tool Co. 174
Griscom-Russell Co., The 98
Gulberson Corporation 160

Halliburton Oil Well Cementing Co. 21
Happy Company, The 92, 93
Hartzell Propeller Fan Co., Div. of Castle Hills Corp. 2
Hilliard Corporation, The 149
Homestead Valve Manufacturing Co. 25
Honan-Crane Corp. 119
Houston Contracting Company 148
Hughes Tool Co. Back Cover

Inferno Co., The 158, 179
International Harvester Co. 89

Jandru Steel Corp. 148
Johnston Testers, Inc. 24
Jones & Laughlin Steel Corporation, Supply Division 138

Kaiser Steel Corporation 6
Kelley Company, Ben F. 169
Kelley Manufacturing Company 170
Kenyon & Sons, Ltd., William 120
Kewanee-Ross Corporation 17
Koch Engineering Company, Inc., The 152

Lane-Wells Company Inside Front Cover
Leschen & Sons Rope Co., A. 173
LeTourneau, Inc., R. G. 14, 15
Levingston Shipbuilding Co. 150
Link Engineering Company 144
Little, Inc., Arthur D. 7
London & Midland Steel Scaffolding Co., Inc. 74

Manning, Maxwell & Moore, Inc. 10
Mark & Company, Clayton 48
Marley Company, Inc., The 156
Marlow Pumps 151
Mathieson Chemical Corporation 13
Mayo Hotel, The 148
Mixing Equipment Co., Inc. 134
Moon Brothers, Ltd. 43
Murphy, Frank W. 114

National Airoil Burner Co., The 152
National Aluminate Corp. 71
National Bank of Tulsa 97
National Tank Company 192
Nicholson & Co., W. H. 43
Nicolet Industries, Inc. 114
Norris Brothers, Inc. 148
Norris Manufacturer, Inc., W. C. 50

Oil Well Mfg. Corp. 96
Oil Well Supply Co. 4
Otis Pressure Control, Inc. 45

Pacific Gear & Tool Works 101
Parelex Corporation 159
Peerless Pump Division of Food Machinery & Chemical Corporation 121
Perrault Fibercast Corporation 128
Phoenix Manufacturing Company 155
Pioneer Rubber Company 165
Pittsburgh Coke & Chemical Co. 41

Raybestos-Manhattan, Inc., Packing Div. 8
Reading-Pratt & Cady Division of American Chain & Cable Co. 47
Reed Roller Bit Company 49
Republic National Bank of Dallas 34
Republic Rubber Division of Lee Rubber & Tire Corp. 181
Republic Steel Corporation 28
Rockford Clutch Division of Borg-Warner Company 177
Rockwood Sprinkler Company 31
Ryerson & Son, Inc., Joseph T. 140

S&R Tool & Supply Co. 172
Scott-Rice Company 159
Second National Bank of Houston 136
Sheffield Steel Corporation 18
Sherry Netherland Hotel, The 154
Smith & Sons (Nottingham), Ltd., Sidney 130
Smith, Barney & Co. 162
Smith Corporation, A. O. 181
Snap-On Tools Corporation 163
Southern Mill & Mfg. Co. 37
Standco Brake Lining Co. 159
Steel Forgings, Inc. 148

Taylor Forge & Pipe Works 142
Texas Company, The 16
Timken Roller Bearing Company Front Cover
Treicilite Company 29
Triangle Conduit & Cable Co., Inc. 179
Tube Turns, Inc. 85, 86
Twin Disc Clutch Co. 100

U. S. Steel Corp. Subsidiaries 4

Vogt Machine Co., Henry 30

Wall Colmonoy Corporation 171
Web Wilson Oil Tools 179
Western Gear Works 101
Western Supply Company 113
Wheland Company, The 40
Wickes Boiler Co., The 167
Wiepower Mfg. Co. 154
Whitt & Chambers, Ltd. 130
Wood's Sons Co., T. B. 159
Youngstown Sheet and Tube Company Inside Back Cover

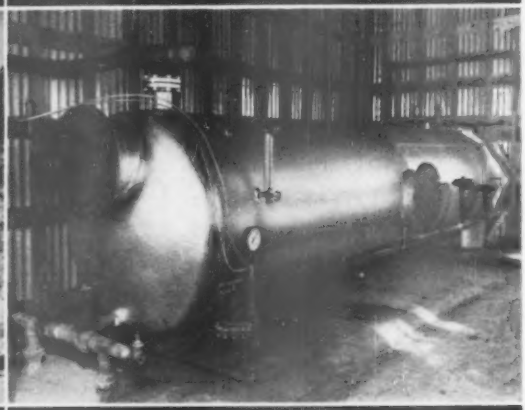
LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 994 acres of land in Ts. 34 and 35 N., Rs. 2 and 3 W., and T. 35 N., R 4 W., P.M., Montana, within the known geologic structure of the Kevin-Sunburst field, will be offered in seven parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, February 18, 1953, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Billings, Montana, or to this office. Marion Clawson, Director.

National Steam Generator in West Texas making steam for "U" Type Condenser located in wood treater.

National Steam Generator in Western Nebraska furnishing heat to tank coils to treat oil and keep storage at pipeline temperature.

National Steam Generator in California handling 460 bbls. of 12° API Gravity crude per day at 170° outlet temperature.



National Steam Generator in Utah keeping production in stock tanks at 110°. Crude is 37° gravity with pour point of 90°.

NATIONAL HORIZONTAL STEAM GENERATORS

(14½ PSI)

GENERAL SPECIFICATIONS

Size	Heat Cap. Rating Btu/Hr.	Model	Approx. Shipping Weight
2 x 6	250,000	B26	1150#
3 x 7½	500,000	B37	3200#
3 x 10	750,000	B310	3400#
3 x 12½	1,000,000	B312	3600#
4 x 10	1,300,000	B410	4600#
4 x 15	2,000,000	B415	6180#

The National Low Pressure Steam Generating Heaters are built and stamped in accordance with the latest edition of the ASME Low Pressure Heating Boiler Code. Standard accessories include the Code-required low water shutdown. Steam Generators may be had with or without removable firetubes. There are many other sizes than those listed at left which are available on request.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

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Sailor Beware! The Old Man of The Sea!

WHO has not read of Sinbad, as told in the Arabian Nights by glamorous Scheherazade?

Shipwrecked on a strange island, the unfortunate sailor came upon a weak old man. Moved by compassion, Sinbad took the feeble fellow on his back, carried him over the brook, gathered fruit and fed him. But when Sinbad asked him to get down, the old man refused, wrapping his legs about his neck, almost strangling him.

The sailor fainted and fell down, yet the old man clung ever closer. He rained blows on Sinbad, driving him about without rest, to pick fruit and do his pleasure. This went on and on, until the desperate sailor made wine from wild grapes to appease his own plight. One day noting Sinbad's pleasure, the old man snatched a gourd of wine and gulped it down. Completely drunk, he loosened his grip and Sinbad threw him off. Saved by a passing ship, his rescuers said, "You are the first ever to escape strangling by the Old Man of the Sea".

Dating back hundreds of years, the Old Man is an allusion familiar to everyone. He is a warning figure today. Our nation, surviving the storms of two world wars, wanders down strange ways. With kindly intent and glorying in its own strength, America is tempted to shoulder the Old World and its age-worn problems. But weak and feeble as the Old World appears to be, let us beware! How easy to assume a burden which would quickly exhaust our strength, strangle us as a nation, and in the end leave the world as weak and exhausted as it was before our foolish undertaking!

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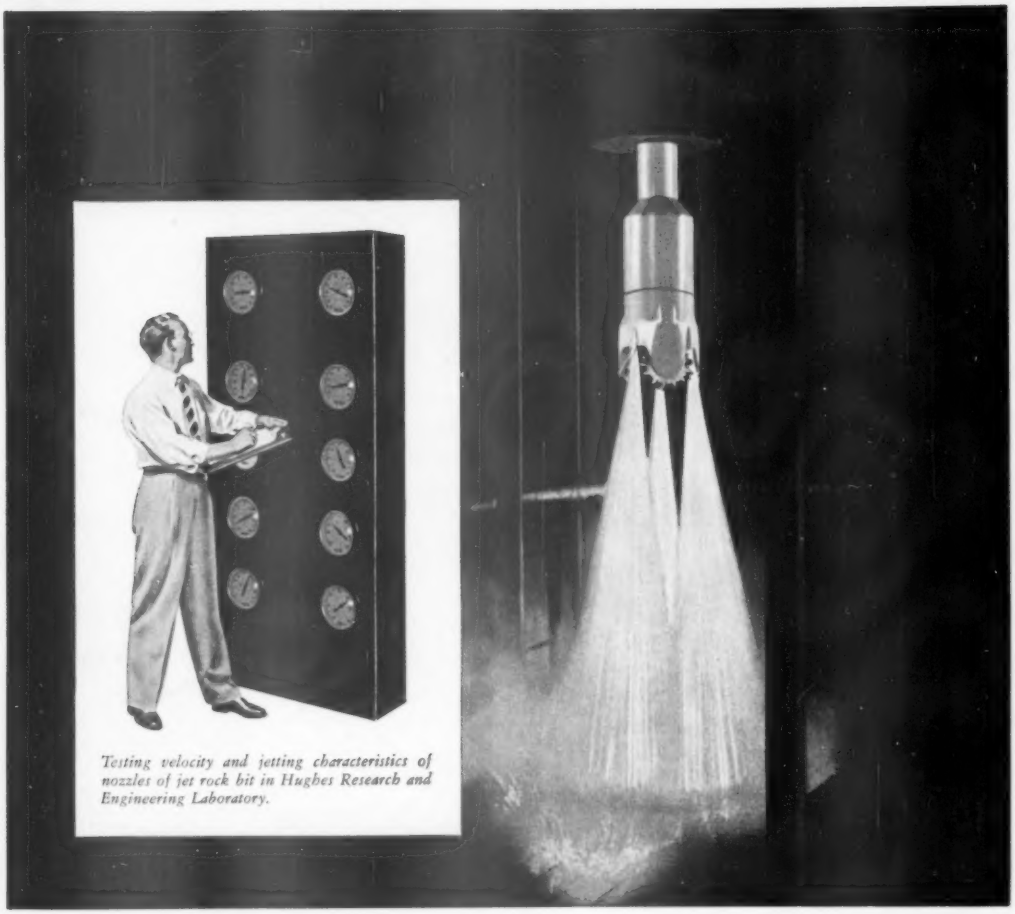

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